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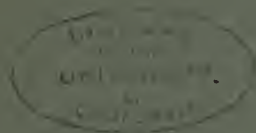
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AGRICULTURE IN OTHER LANDS.

NOTES COLLECTED DURING THE COURSE
OF A VISIT, IN 1910, TO EUROPE,
NORTHERN AFRICA, AND
ASIA MINOR.



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AGRICULTURE IN OTHER LANDS.

By ARTHUR J. PERKINS, Principal Roseworthy Agricultural College.

EGYPT.

The feature which must most strongly impress the visitor interested in agricultural matters is that rural Egypt is one vast object lesson to the irrigationist. Here is a country that is to all intents and purposes practically rainless supporting, nevertheless, a flourishing rural population; and which, if we except the Suez Canal and the much-fleeced tourist, is wholly dependent for its revenues on the agricultural produce of the soil. The total area of Egypt proper is given as about 400,000 square miles, the great bulk of which is a barren waste, carrying not a vestige of vegetation from one end of the year to the other. Of this area in 1909 there were about 6,500,000 acres under cultivation—4,000,000 acres in the Delta and about 2,500,000 acres in the narrow Valley of the Nile. It is calculated that the raising of the Assouan Dam will have the effect of winning over from the desert an additional 1,000,000 acres. By themselves these figures convey but an inadequate image of the facts as they may be observed here—on the one side an absolutely desert waste, and contiguous with it a few million acres of marvellous fertility, the productiveness of which cannot probably be matched anywhere else in the world. One cannot describe cultivated Egypt better than by the statement that it has all the appearance of a huge vegetable garden, from every corner of which the utmost is extracted by the industrious cultivator.

This great productiveness Egypt owes, as is well known to everybody, to the Nile both directly and indirectly. The Nile in the course of ages has built up a soil of great fertility, which it continues to enrich and supply with all essential moisture at the present time. I had imagined that there must be in Egypt some form of unirrigated agriculture practised. I am informed, however, that, apart from a few sandy acres occasionally sown to barley in the neighborhood of Alexandria, this is not the case. That this should be so will readily be understood when it is stated that, with a very high average temperature, the rainfall at Alexandria to the north of the Delta is about 8 in., whilst that of Cairo at its southern apex is only 1 in. Agriculture, therefore, in its widest sense appears to be possible only on such lands as come within the reach of the Nile waters.

The complete absence of rain both in winter and summer renders necessary the use of irrigation waters for both winter and summer sown crops. In

former times, apart from a very limited area of country in the immediate neighborhood of the river, the growth of winter-sown crops was all that was possible in Egypt. The flood-waters of the Nile were periodically intercepted in huge protected basins, where they deposited a rich silt, besides saturating the land with moisture. After a stay of 50 days to 60 days the flood-waters were withdrawn, and in the mud were sown the winter crops of corn, beans, &c. No summer crops were possible, as a falling Nile made summer irrigation impossible. This is the practice that is still known in Egypt as basin irrigation, and which is still in force over the greater portion of Upper Egypt. Towards the beginning of the nineteenth century the first steps towards what is known here as "perennial" irrigation were taken. The two main branches of the Nile were dammed back some 12 miles north of Cairo, and suitable canals were made to supply a continuous flow of irrigation water from one end of the year to the other. At the present time "perennial" or "continuous" irrigation is practised throughout the Delta, whilst the Assouan Dam will soon render it possible over the bulk of Upper Egypt.

The average temperature in Egypt is high, and the growth of plants therefore exceedingly rapid when within reach of an adequate supply of moisture. It follows, therefore, that wherever "perennial" irrigation is possible the Egyptian soil is made to yield two crops in one year; and as the value of the summer crop is usually considerably in excess of that of the winter crop, it is calculated that the possibility of "perennial" irrigation more than doubles the productiveness of the land.

In a country in which regular agricultural statistics are not kept it is exceedingly difficult to form an adequate idea of general values and returns. The rental values of agricultural land will give a very fair idea of the value of the land. For good cotton land I find that as much as £12 and £14 an acre is paid annually in rent, whilst relatively poor land pays as much as £3 and £4 an acre rental. In the neighborhood of cities where vegetables are raised as much as £20 an acre are paid in rent. Where cotton cannot be grown rents are lower. No statistics existing on the subject, I found it difficult to secure an approximation as to the average rental throughout Egypt; authorities appear to differ in the subject between £3 and £6 an acre. If we take £4 as a fair average, this represents an average value of £100 an acre for agricultural land—a figure which cannot, I think, be approached anywhere else in the world.

The principal direct tax in Egypt is the land tax, which varies according to districts and quality of soil, but which averages out at about £1 an acre throughout Egypt. It is right to state that no charge is made for the supply of irrigation waters, towards the cost of which the land tax contributes.

As Australians, it is as well that we should recollect that without irrigation all this land is absolutely worthless, and that the possibility of using water

raises the value of 7,000,000 acres of otherwise valueless land to an average of £100 an acre, and perhaps more.

In Egypt the crop which dominates all agriculture is the cotton crop, and wherever "perennial" irrigation is possible all other crops become subsidiary to it. The area under cotton has risen steadily within recent years. In 1893 it was represented by 966,000 acres, and in 1908 by 1,641,000 acres; in 1893 it occupied 15·21 per cent. of the total area under crop, whilst in 1908 it occupied 21·59 per cent. of the same area. There is no doubt, too, that with additional facilities for summer irrigation in Upper Egypt the area under cotton will be still further increased. Within recent years, however, notwithstanding the increase of acreage under cotton, local authorities have been faced with the disquieting feature of steadily decreasing outputs, implying a shrinkage in yields. So serious does the position appear that a special commission has been appointed to inquire into the question. Insect pests would appear to have contributed somewhat to this decrease in yields. From what, however, may be observed currently, abuse of irrigation and insufficient attention to drainage would appear to be at the root of the evil. The water supply has apparently been very abundant latterly at critical periods of the year, and the anxious grower has been unable to resist the temptation of giving his plants more water than is good for them, with the result that the soil is absolutely sodden and waterlogged, rendering impossible healthy root action. An additional consequence of this excessive irrigation is the appearance of salt patches where they had never been known before. I was at first puzzled to account for the apparent failure of lucerne in Egypt; I was told that it would not grow in summer. But with land at its maximum of saturation at this time of the year it is not difficult to realise why lucerne should not succeed.

The Irrigation Department appear to supply ample drainage channels for the removal of the surplus waters. These channels, however, must remain more or less ineffective so long as they are not adequately fed by a huge network of well-kept private drains, drawing off regularly and to a proper depth the salt-laden waters of the sodden fields. The impression one gets, even at this time of the year, is that drainage is very much neglected by the average cultivator; and that unless energetic measures are speedily put in hand to remedy this defect there will be a still further decrease in cotton yields in the near future. It might be added that it will be well if Australian irrigationists keep these facts steadily in view.

Next to cotton in importance—indeed, excelling it in area, if not in value—comes the maize crop, which in 1908 occupied 23·69 per cent. of the area under crop. It is grown very largely as a catch crop late in the summer, either after wheat or more frequently after late clover.

In third rank comes the *Berseem* or Egyptian clover (*Trifolium Alexandrinum*), of which there appear to be several local varieties. Although it is mainly grown as a catch crop, it is in many respects the stand-by of the

Egyptian agriculturist, whose live stock are fed on "berseem" almost exclusively for six months of the year. One cannot help but being impressed with the luxuriant appearance of "berseem" fields at this time of the year; and as it is possible that either as an ordinary catch crop or as winter fodder on the Murray irrigation settlements "berseem" may prove of value to South Australia, I append a few notes on its treatment here. I have also made arrangements for the forwarding of some fresh seed during the course of the year.

"Berseem" appears to be generally treated here as a catch crop; that is to say, the soil in which it is sown receives no special preparation. It is sown in the autumn of the year between mid-September and mid-November, and frequently in a standing summer crop that has not yet been completely harvested, such as cotton, maize, dura, &c. The rate of seeding has been stated to be about 40lbs. to the acre, representing something like 10s. in value. From personal experience with similar seed, I should look upon such seeding as excessive, and imagine that with fresh seed 20lbs. should prove ample. "Berseem" is always sown in land that has been recently flooded, and the seed germinates almost immediately. It is generally irrigated two or three times before the first cut, which will take place within 45 days to 60 days of germination; the young plants are allowed to shoot out again before flooding, and the second cut may be taken within 45 days of the first; later on a third and even a fourth cut may be taken at equal intervals of time. The first cut is very succulent, and later cuts drier and more nourishing. The last cut is frequently left for seed. All the live stock of the country appear to be kept on "berseem" during the winter and spring months; and I can testify to their condition being on the whole fair, which, I am informed, is not the case during the summer months when no "berseem" is available. Bullocks, buffaloes, asses, &c., are tethered out in the miniature fields, in which a circle of "berseem" is cut out for them for feed. In no cases did I notice the live stock trampling down this luxuriant growth, although I am informed that it is sometimes done. In the neighborhood of cities "berseem" is cut and carted on the backs of camels for the benefit of city horses. I was told that one acre of "berseem" would in one cut provide feed for 100 working bullocks for one day, and that from half to three-quarters of an acre of "berseem" would keep a working ox for six months.

"Berseem" favors heavy ground, but requires good drainage to give best results. In Egypt it grows well in winter, running to seed in spring. If cotton follows "berseem" the ground is broken early; if maize follows it, the soil is broken late.

In fourth rank comes wheat, which in 1908 was represented by 15.38 per cent. of the total area under crop, as against 20.42 per cent. in 1893. Wheat indeed appears generally to have fallen out of favor, and Egypt, once the

granary of Rome, is now a wheat-importing country. What crops of wheat I was able to see were, according to my ideas, very rank, and open to lodging and red rust; these accidents, however, I was informed, were not to be feared. I saw some grain at the native markets; it was, however, poor and ill-grown. By comparison with local wheat, and indeed with imported wheats, I have heard a shipment of South Australian wheat (1907) very highly spoken of. No statistics as to yields are collected; I am informed, however, that the average is probably between 20bush. and 24bush.

Next come beans, then barley, then rice, then sugarcane, which is almost exclusively confined to Upper Egypt, and a few other minor crops.

In the distribution of crops grown some attention appears to be paid to a proper system of rotation; and where the growing of cotton is possible, the rotation adopted is one meeting the requirements of this crop. Formerly a three-year rotation appears to have been in general use; that is to say, a rotation in which cotton appeared once in three years. This, however, appears to have been abandoned latterly in favor of a two-year rotation; indeed, in some few instances cotton appears to have been grown several years in succession, which may be one of the contributing factors to the decrease in yields.

The three-year rotation was arranged somewhat as follows:—

First Year.—Clover in winter, followed by cotton in summer, in the standing plants of which clover might again be sown in early autumn.

Second Year.—Or else beans are sown, followed by maize in summer.

Third Year.—Wheat, followed by maize in summer.

The two-year rotation most in use at the present time appears to be—

First Year.—Clover in winter, followed in summer by cotton.

Second Year.—Beans or wheat, followed by maize in summer.

Whatever the practice adopted it will be noted that the land is kept always under crop. There is no doubt that this fact, by keeping in check surface evaporation, must do much towards minimising the danger of the rise of salt.

I was anxious to ascertain how tenants could make two ends meet after paying the high rents already alluded to. For the purpose I asked the manager of a large estate (Mr. T. L. Smith, of Constantinia) to give me his views of the case. These I reproduce below as closely as I am able.

According to Mr. Smith, the tenant looks to his cotton crop to pay his very high rent, whilst all other crops represent his personal profits, after deduction of working expenses. He took as an example an area that could conveniently be worked by a pair of oxen, namely 20 acres; of this area 8 acres would be sown to cotton, 6 acres to wheat or barley, and 6 acres to rice, whilst the bulk of the area would carry "berseem" in winter, except the area under wheat. For these 20 acres the tenant would pay about £80 rental.

The 8 acres of cotton might yield him $3\frac{1}{2}$ cantars (= about 99lbs.) an acre. Locally within the last 10 years the value of the cantar of cotton appears to have fluctuated between £2 and £5; at £3 10s. this would represent per acre

£12 5s., and a total of £98 for the 8 acres under crop, that is to say an appreciable excess over the rent paid for the 20 acres of land.

The 6 acres under wheat would yield 20bush. to the acre, which at 5s. would return £30.

From the 6 acres of rice might be expected three-quarters of a ton per acre at £4 a ton, representing a total of £18.

Thus the gross returns from the 20 acres might be summarised as follows :—Cotton, £98 ; wheat, £30 ; rice, £18 : total, £146.

The £66 in excess of the rent would represent the tenant's return for his labor, in addition to what profit might be derived from the clover, which would be much in excess of the requirements of his live stock ; together with a crop of maize which might be taken after the wheat.



Egyptian Agricultural Implements—Plough, Scoop, and Leveller.

It should be noted that in Egypt the fellah lives exceedingly cheaply, and that field wages are correspondingly low ; men receive between 10d. and 12d. per day, and women between 5d. and 8d. per day. From one point of view their work is apt to be slow, and stands in need of much supervision ; thus one pair of oxen does not plough here more than half of an acre a day. One cannot, however, help admiring this sturdy race of country toilers, with their help-mates as erect as young poplars ; indeed, there is many a piece of field work that I have examined here that would have taxed the skill of the most expert European farm-hand to equal. If the Egyptian farm laborer needs driving when working for others, his toil and industry are unremitting when working for himself.

What farm implements and tools are in use are exceedingly primitive ; chief amongst them appears to be the " fass " a heavy triangular hoe, with which the bulk of the field work is done. The Egyptian plough is the old Roman plough, still in use in India and Southern Europe ; it has a heavy wood body, to which is attached a strong cultivator tine, which is made to tear through the ground, frequently to considerable depths. The soil is merely ridged, the sod not being turned ; and the work to be effective must be followed immediately by a second ploughing given at right angles to the first.

Another useful Egyptian implement is the " cassabia," or levelling scoop, essential to a race of irrigationists. The fellah handles this levelling scoop admirably ; with the aid of his eye alone he is able to level off perfectly his seed-bed.

The native threshing implement consists of a series of revolving discs fixed to a sort of cart, which is dragged over the stalks of corn by oxen, both chaffing the straw and treading out the grain in one and the same operation. It is this chaffed straw which so inefficiently succeeds " berseem " as the summer feed of live stock.

Fortunately for Egypt its system of irrigation does not involve any high lifting of water. The highest lift known on the river was stated to be about 60ft. In the majority of cases, however, at flood times the water flows over the channels, and floods the prepared areas ; at the outside there may be a lift of 4ft. to 6ft., which is carried out by native water-wheels and Archimedean screws. There are many, however, who think that it would have been better policy to force the fellah to raise his water to greater heights. This would have forced upon him the use of a greater number of draught stock, the manure from which would serve to enrich his land, and at the same time helped to check him in that extravagant use of water, which appears to be fast ruining the country.

There is very little to be said in praise of the general live stock to be seen about the country. Horses are never used in field work, and are practically confined to city vehicles. Occasionally one sees a few fine carriage pairs ; but the bulk are very light and weedy.

Donkeys are the pride of Egypt, and are very numerous. I should not be surprised that if a census were taken they were found quite to equal in numbers the native population. Mules are frequently used as draught animals ; I was not, however, impressed with either their size or quality. Camels are mainly beasts of burden, and whilst superior to those of Aden, inferior to Tunisian and Algerian camels.

The work of the fields appears to be done almost exclusively by bulls and bullocks and cow buffaloes. The bullocks are ungainly, badly built animals, but in the whole heavier than might have been anticipated. They are very leggy, and might readily be improved upon. Of the buffaloes, curiously enough, none but cows are ever to be seen ; they are useful but ungainly

beasts, yielding both milk and labor at one and the same time. When young they are enveloped in a long, shaggy coat, which they lose at maturity, when they become practically hairless. In the summer time they cannot be worked, as they take to water to escape from insect tormentors, in which the land, as of old, abounds. Good bullocks appear to be worth £15 to £20.

Sheep for the most part are black and tailed, covered with long hair that is here called wool. There is no doubt that the average Egyptian sheep is a very poor animal, perhaps the poorest sample of its species that I have ever seen ; and yet the fellah is unreasonably proud of it. I was endeavoring to ascertain from a native woolspinner why in Egypt preference had been given to black sheep, whilst in most other countries white sheep were preferred, but the only answer I could secure was that Egyptian sheep were the best in the world.



. Egyptian Ploughman and his Team

These sheep are generally found in small flocks of 5 to 30, guarded by small boys, grazing wherever any scanty herbage was available. They occasionally follow cattle in the "berseem" fields. The coarse wool is wholly reserved for strictly home consumption. From what little I was able to observe, I am strongly of the opinion that there are at least two distinct breeds of sheep here ; I was not able, however, to determine their peculiarities very closely. These sheep appear hardy enough, and, considering the conditions to which they are subjected, must be practically immune to footrot.

Of orchards there exist very few in Egypt, and what there are are very badly kept. They generally contain citrus trees, and, to lesser degree, apricots and peaches. The trees appeared to me everywhere too closely planted, and unhealthy looking.

I have carefully examined Egyptian imports to ascertain whether any of our produce might find an outlet here. I summarise below a few data on this subject.

The population of Egypt is between 11,000,000 and 12,000,000, of which not more than 150,000 are Europeans. The total imports in 1908 were represented by about £25,000,000 sterling, and the total exports by £21,000,000 sterling. The principal lines of imports in 1908 were represented by textiles, about £6,500,000; cereals, vegetables, flour, &c., about £3,750,000; timber and coal about £3,333,000; metals and manufactured metal, about £3,000,000; animals and animal food products, about £1,000,000, &c., &c.

I append below some of the principal imports in which we might be interested, together with their present origin:—

1.— <i>Meat, Salted, Smoked, or Frozen</i> —£111,452.		£
From Great Britain		25,989
British Oriental Possessions		19,981
Italy		16,313
Austria		15,069
France		12,270
Turkey		11,955

“British Oriental Possessions” includes, of course, Australia and New Zealand.

2.— <i>Butter</i> —£112,514.		£
From Turkey		83,524
British Oriental Possessions		17,601
Italy, &c., &c.		5,338

3.— <i>Cheese</i> —£174,273.		£
From Turkey		110,519
Italy		17,874
Switzerland		11,231
British Mediterranean Possessions.....		11,203
Holland		8,815
France		6,759

4.—*Honey*—£1,273.

Mostly from Crete. I find honey retailing here at 1s. to 1s. 6d. per pound. There should be a good field for our honey amongst a population exceedingly fond of sweet things, to the extent of sucking sugarcane in the streets.

5.— <i>Condensed or Sterilised Milk</i> —£20,437.		£
From Switzerland		9,191
Great Britain.....		6,936
Germany, &c.		1,394

6.— <i>Wheat</i> —£145,509.		£
From Turkey		70,440
British Mediterranean Possessions.....		67,249
British Oriental Possessions, &c.. &c.....		6,009
7.— <i>Maize</i> —£147,188.		£
Turkey		106,002
Roumania		20,747
Russia		12,759
Bulgaria		6,967
8.— <i>Barley</i> —£148,399.		£
From British Mediterranean Possessions.....		79,146
Turkey		42,096
Austria		14,009
Russia		8,355
Roumania		3,668
9.— <i>Potatoes</i> —£66,131.		£
Italy		52,505
France		8,364
British Mediterranean Possessions, &c.. &c. ..		4,165
10.— <i>Flour</i> —£1,753,270.		£
From France		1,107,235
Great Britain.....		292,045
Russia		124,607
Italy		72,821
Germany		37,559
Roumania		35,475
United States		29,055
Belguim		21,437
Bulgaria		12,983
British Oriental Possessions		12,196
Canada		3,063
11.— <i>Grapes</i> —£59,737.		£
From Turkey		57,008
12.— <i>Bananas</i> —£16,010.		£
From Spain		15,929
13.— <i>Other Fresh Fruit</i> —£195,904.		£
From Turkey		137,335
Italy		23,759
British Mediterranean Possessions.....		16,114
Greece		15,768

14.— <i>Dried Fruit</i> —£260,428.		£
From Turkey	173,702	
France	28,957	
British Oriental Possessions	24,451	
British Mediterranean Possessions	17,051	
Italy	6,904	
Spain	6,498	
15.— <i>Sugar</i> —£580,530.		£
From Java	112,294	
Russia	414,123	
16.— <i>Jams and Preserves</i> —£87,413.		£
From Britain	51,946	
France	14,238	
Turkey	9,581	
British Oriental Possessions	2,028	
17.— <i>Wines</i> .		£
3,372,521galls. in wood, valued at	129,693	
35,794doz. bottles, valued at	36,322	
The principal suppliers of wines are France, Turkey, Italy, and Greece.		
18.— <i>Brandies, Whiskies, &c.</i> —£140,123.		
Mainly from Great Britain, France, and Greece.		

I learnt accidentally that superphosphate from Holland, going 16 per cent. to 18 per cent. of phosphoric acid soluble in water and citrate, can be delivered c.i.f. at Alexandria for £2 7s. a ton.

GREECE.

WINES, CURRANTS, AND CROPS.

From Egypt I passed over to Greece, where I spent four weeks. From thence I visited Asia Minor and Constantinople, and am now on my way to Tunis and Algeria. I propose for the present submitting a few observations collected in Greece.

I wish to state at the outset that, beyond furnishing in some instances the confirmation of some of our own practices, there appears to be little that Greece can teach us in the matter of agricultural practice. In this direction, indeed, the Greeks themselves—at all events many of those with

whom I was brought in contact—appear conscious of some flaw in their armor. The complete absence of that vaunting and cocksureness which we are apt to consider the natural attributes of southern Europe must agreeably impress the casual visitor. Much of this no doubt is the wholesome fruit of prevailing financial depression, for the existence of which Greece alone can hardly be held responsible. In Greece one sees no evidence of that prosperity so characteristic of Egypt, but much humble recognition of failure, which assuredly augurs well for the future. The Greeks and their deeds are too frequently decried by those who overlook the short period of years that separates them from six centuries of servitude and stagnation. Rather should they be praised for what they have been able to accomplish in so short a period of time, heavily handicapped by racial degeneration.

The present population of Greece is said to be 2,632,000, or about 107·3 to the square mile. The total imports in 1908 were represented by £6,105,415, or about £2 6s. 5d. per head of population; and the total exports by £4,369,773, or about £1 13s. 4d. per head of population. Great Britain is by far the best customer of Greece, and also heads the list of countries from which commodities are imported. Next in order of purchasing countries come Austria, America, Germany, Holland, &c., whilst after Great Britain the bulk of the imports are derived, in order of importance, from Russia, Austria, Germany, Turkey, Bulgaria, &c.

One must note with surprise that in a country devoid of large manufacturing and mining interests, and which must therefore be dependent on what the soil can be made to produce, the bulk of the imports should be classed under the heading of "Agricultural Products," which in 1907 were valued at £1,902,604 out of £5,962,700.

Similarly under "Live Stock" we find in 1907 £51,478 worth of large cattle imported; and in a country the hills and short pasture of which are pre-eminently suited to sheep and goats as much as £56,145 worth of the latter are imported. Additionally £2,698 worth of pigs, and even £5,278 worth of poultry are brought from foreign countries.

It is not easy in the course of a few weeks' visit to form a correct estimate of the agricultural resources of a country that has not yet realised the importance of the systematic collection of agricultural statistics. The position will be more readily understood when it is stated that the absence of any general survey of the country has hitherto prevented the imposing of a land tax, and that in consequence the Greek farmer is not taxed in proportion to the land he may possess, but in proportion to the number of ploughing oxen he is able to keep—a truly primitive expedient, establishing a premium on poor, indifferent tillage. The facts I have been able to collect on the subject I owe very largely to a perusal of consular reports, kindly placed at my disposal by His Excellency the British Plenipotentiary (Sir Francis Elliott) and to verbal information supplied me by Mr. Chassiolti (Director

of the Athens Agricultural Station) and other agriculturists whom I had occasion to meet. In the course of my wanderings, too, I have endeavored to keep my eyes as well as my ears open.

In the first place it appears to me that the country suffers from certain physical defects which must ever hinder it from becoming a truly great agricultural country. The rocky hills, the brilliant sunlight, which form the indescribable charm of Greece, do not contribute much towards agricultural fertility. Certain portions of Greece, it is true, are frequently described as exceptionally fertile. I fear, however, that the term is very largely relative, and that it is only by contrast with the vast masses of limestone rock that what would elsewhere be looked upon as very medium soils are here described as fertile. I must say that personally, apart from a few sheltered valleys of moderate area, I saw no important tract of country that could be described as fertile. To this must be added that the rainfall is rather scanty, particularly in the Peloponnesus.

Nature, however, is not alone to blame for poor agricultural returns. It is to be feared that the apathy and indolence of the population must take its share of blame. Greece was at one time a well-wooded country; indeed, there exist vast tracts of country which if treated intelligently as forest lands would prove both directly and indirectly of great advantage to the State, which are now nothing but barren wastes, affording a scanty existence to a few goats. Unfortunately the Greek does not love trees. Witness the way in which he is constantly pollarding and torturing the trees of his avenues and city squares. Within recent years, I am told, vast areas have been laid bare of their forests; and if destruction is allowed to continue unchecked, Greece will be practically treeless in the course of a few years. The deteriorating influence of deforestation on climate is too well known to need insisting upon; indeed, to it we may attribute some of the present agricultural misfortunes of the country.

The principal indigenous forest tree in Greece appears to be the Aleppo pine (*Pinus halepensis*), which thrives so well in the drier districts of South Australia. The Greeks extract from it a certain amount of resin, as is the case with the Maritime pine in the south-west of France. In lesser quantities there are three species of oaks, chestnuts, horse chestnuts, elms, ash, &c.

Currants form one of the principal articles of export in Greece, and as, unfortunately, production appears to have overtaken the requirements of the world's markets, currants have within recent years proved a disturbing factor in Greek economics. Curiously enough, it is the English-speaking world alone that finds room for the currant in its ordinary dietary; hence in this direction Great Britain and America are practically the sole customers of Greece; and, unfortunately for Greece, within recent years California has shown itself able to produce both currants and other dried fruit, which tend to replace currants in domestic arrangements.

Prior to 1870 the average currant crop appears to have been about 75,000 tons, the whole of which found a very ready market. Towards that time European vineyards began to die out before the attacks of the phylloxera, and as in the south of Europe wine practically forms a staple article of diet of the whole population, wine merchants proceeded to buy up in the East all dried fruit available, including currants, from which wine could be made. The misfortunes of European vinegrowers gave a tremendous impetus to currant-planting in Greece, with the result that production at the present time is between 185,000 tons and 190,000 tons a year. So long as Europe required currants for wine-making purposes there was no particular difficulty in disposing of this large crop. In the course of time, however, European vineyards were gradually built up again on American stocks, and this particular opening for surplus currants was lost. At the present moment the world's consumption of currants is much below the annual production of Grecian vineyards. Thus, according to Mr. Alban Young, in his report on Greek finances for 1907-8, the world's consumption of currants in 1905-6 was represented by 112,500 tons, in 1906-7 by 116,000 tons, and in 1907-8 by 120,000 tons.

Thus each year a heavy surplus has been left on the hands of growers and merchants, with the result that the market has become completely disorganised. The importance of the interests concerned has been so great and the outcries so emphatic that for the last 15 years or so the Government has been endeavoring by special legislation to dodge the economic Nemesis that threatens Greek currant-growers. It is unnecessary to detail all the expedients that have been resorted to; it may be stated, however, that for the most part they appear to have been illusory. In ultimate resort the further planting of currant vines has been prohibited by law, and a new law has been introduced, giving power to the "Privileged Currant Company" to cause the uprooting of surplus vineyards, subject to the payment of adequate compensation.

That the currant industry is in the throes of a painful crisis must be evident to anybody cursorily examining the vineyards. Many of the latter are very carefully tilled and cared for; but, on the other hand, many appear to be wholly abandoned and neglected. I was informed by Mr. F. B. Wood, British Consul at Patras, who is himself a currant-grower, that in present circumstances currant-growing is unremunerative to the large grower who has to pay for labor, and that in consequence currant-growing is rapidly falling into the hands of peasants, who do all the work with their families. According to Mr. Wood, the working expenses of a currant vineyard are represented by 70 drachmas per stremma, that is to say, about £11 an acre. This estimate certainly appears very heavy, particularly when labor is only paid at the rate of 2s. 6d. a day for men and 1s. 3d. a day for women. It should be noted, however, that absolutely everything in the currant vineyard

is done by hand ; that plough, harrow, or cultivator is an unknown thing here. The vineyards appear to be very irregularly planted ; originally individual plants seem to have been placed between 3ft. and 4ft. apart. Considerable irregularity arises subsequently from the practice of frequent layering, which appears to be very largely adopted for increasing the existing number of plants, or for renewing old ones that have become injured or effete. The main winter tillage consists in mounding up all the earth in a central pyramid, having four vines at its base. This form of tillage, although very perfect, must be very costly. The work is done by hand with a heavy, short-handled hoe. Both women and men take part in it in long, cheerful gangs. I have seen as many as 20 at a time working together in a vineyard not four acres in area. Subsequently in spring, after the fall of the bulk of the rains, these mounds are levelled down, and what weeds may have sprung up destroyed. The vineyards do not appear to receive any further summer tillage beyond perhaps occasional hoeing up of rank weeds. I was informed by one grower that the work of tilling over a vineyard twice could be done by three men to the stremma, or 12 men to the acre ; and as in the Peloponnesus alone there is as much as 250,000 acres under vines (including wine grapes, which are similarly treated), the tillage of the soil affords a vast amount of occupation to the peasantry.

I was not much struck with the way in which the vines are pruned. This operation appears to be carried out rather carelessly, much less well than is the case in the Smyrna vineyards which I visited later on. Old vines carry long, straggling arms, and are covered with dead wood. They are trained to very irregular gooseberry bushes, carrying as a rule three to four rather long spurs. Where Sultana vines are grown one or two rods appear to be used in addition. It should be stated here that in Greece the Sultana is used very extensively as a table raisin. A sharp pruning hook is employed for all pruning operations.

The vineyards in Greece are subject here to both downy mildew (*Peronospora*) and to oïdium. To protect the vines against *Peronospora* the vineyards are sprayed two or three times during the course of a season with Bordeaux mixture (copper sulphate and lime) ; and against oïdium they are dressed with sulphur three or four times, according as the season is more or less damp. Fortunately the phylloxera has not yet been discovered in Greece.

All currant vines are ring-barked early in May, just as the fruit is beginning to set. The general practice consists in making a single incision through the bark on the stem ; although in Volstizzia, the best currant district, the incision is generally placed around the main branches of the vine. The plants are said to suffer less from this practice. According to Mr. Wood, ring-barking has had the effect of increasing the size of the fruit and raising the total yield of the vineyards, but, on the other hand, it has reduced the

quality of the currant. The best quality currants proceed from the neighborhood of Volstizzia and Corinth, in which districts the average yield per acre is relatively low.

The vines themselves are neither trellised nor staked, but each season individual shoots are supported by short bamboo stakes, so as to prevent the fruit from being soiled. This in itself must prove a costly yearly operation.

The bulk of Greek currants are sun-dried on the ground on specially prepared floors. It is stated that this practice results in finer and plumper currants. I was informed that in Volstizzia there is a tendency to dry the currants in the shade under a shed. They are placed on open wire trays, which are piled up one above the other, with plenty of room both above and below for air. When the autumns are sufficiently warm for the purpose, currants dried in the shade are of superior quality; they are said to be softer, more elastic, and of better general appearance. On the other hand, they are apt to rot in the event of cold weather setting in before the drying process has been completed.

The yield of dried currants is between 300lbs. and 1,000lbs. to the stremma, that is to say, from half a ton to 2 tons to the acre. The currants are said to dry at the rate of three of fresh fruit to one of dried.

With a view to ascertaining the position of the Australian grower relatively to a possible export trade, I asked Mr. Wood, who had much experience in the matter, what represented a remunerative price for currants to the Grecian grower. He stated 130 drachmas to the 1,000 Venetian pounds to be a remunerative price; that is to say, a little over £11 a ton.

The best currants are said to proceed from relatively light soils and on gentle hill slopes. So far as can be seen, however, they appear to be planted in every possible description of soil. As a matter of regular practice they do not seem to be irrigated. One cannot, however, help noticing how everywhere in Greece attempts are made to utilise the winter flood waters, which come pouring down from the bare denuded hills. There is hardly a vineyard or an olive plantation that is not steeply banked up and terraced in order to secure some portion of the water that in the main runs to waste.

I omitted to state that at times, when the summer is cold, it is customary to strip the vines of some of their leaves so that the rays of the sun may reach the fruit bunches more effectively.

The wine industry of Greece is of less importance than the currant industry; but, as is also the case I believe throughout Europe, it is suffering from the effects of over-production and declining consumption. According to Mr. Alban Young, the area under wine grapes in 1899 was represented by 204,240 acres, which yielded 53,700,000galls. of wine; whilst in 1908 it had risen to 288,000 acres, which yielded 68,571,000galls. The bulk of the wine is

consumed locally. The following figures, taken from Mr. Young's report, represent the extent of recent exports :—

	Wine Exported. Gallons.	Spirits Exported. Gallons.
1899	6,304,677	226,284
1900	4,826,504	68,232
1901	1,966,994	166,939
1902	4,258,834	106,438
1903	10,370,851	125,668
1904	10,120,009	141,465
1905	5,851,331	189,332
1906	6,103,891	485,790
1907	5,936,440	610,870

I tasted some Greek wines of excellent quality, particularly the light white wines. Unfortunately, as was the case with us some years back, they are exceedingly uneven in type, and the label can never be taken as a guarantee of either quality or even soundness. The varieties from which the wines are made were given to me under Greek names. The extent to which they correspond to any of our varieties I am unable to state, as the vines were not in leaf at the time of my visit. The following varieties are principally used for red wines—Mavrondi, Sirikir, Kondoura, and Kranidiondikio, and for white or pink wines—Phylleri, Roditis, Mavrodaphne, Sabatiano, Parachoritiko, Koliniatiko, Skilopnichts.

Although there exist a few large cellars in which wine is made on modern lines, the bulk of the wine of the country is made by the peasants in hovels, and quite unfit for export, because of the free use of resin in the wine. Resin gives a peculiar aromatic flavor to the wine, which, although not altogether disagreeable, is very unusual. The populace, however, appears to have got used to it, and appreciate it accordingly. I was puzzled to understand how such a practice can have come into existence, until, in reply to a question put to him, a Greek peasant told me that everybody could make *resinato*, i.e., "resined wine," and only experts wine without resin. The position appears to be that the resin is added to the wine as a "preservative," which renders unnecessary the usual essential cellar precautions. I secured the following details from a small peasant winemaker. It is customary to let the grapes get very ripe, so as to have a must corresponding to about 13° Baumé. The fruit is tramped under foot, and for both red and white wines the husks, stalks, and juice are set to ferment in upright wood vats. The cap is pressed down two or three times a day, and fermentation is judged to be completed in five to seven days. The wine is then drawn off into small casks, and resin is added to it at the rate of 4lbs. to the 100lbs. of wine. In about 40 to 50 days the wine is clear and ready for consumption. The casks are neither racked, nor are they filled, and may apparently be left in ullage without ill effects. I am compelled to certify to the fact that the

wines were perfectly sound, albeit aromatic. The use of sulphur appears to be unknown, and yet the empty casks were perfectly sweet. Such, apparently, is the effectiveness of resin.

The Greek brandies I found to be of excellent quality, and I should not be surprised to see them take an important position in European consumption.

Although wheat is grown pretty nearly all over Greece, it is found principally in Thessaly, that province which was added to Greece after the last Russo-Turkish war. Unfortunately, this province appears to be in the hands of a very limited number of large landowners, who get their lands worked by the peasants on halves. Recently this arrangement has given rise to a good deal of discontent and rioting, and, whatever may be the merits of the case, it has not led to the best possible utilisation of the land. The average area under wheat is said to be about 1,625,000 acres, to which correspond



Greek Ploughman on the Reclaimed Land of Lake Kopais.

about 1,250,000 acres under bare fallow. This brings up to nearly 3,000,000 acres the area directly or indirectly connected with wheat. I must add that these figures are merely estimates, as agricultural statistics never have been collected. Occasionally a summer crop of maize may precede the wheat crop instead of bare fallow. Single-furrow ploughs appear to be in general use, although in the reclaimed area of Lake Kopais I saw a double-furrow plough drawn by two pairs of oxen. The bulk of the ploughs used are wooden, similar to those still in use in Egypt. Iron ploughs, however, are steadily becoming more common. The fallows do not appear to be very well worked, and as a result the crops are frequently smothered in charlock and poppies; the latter have the advantage of being far more gorgeously

colored and ornamental than those with which the Australian farmer is familiar. These fallows appear to be cross-ploughed in spring, but at this time of the year the primitive ploughs in use are quite unfit to bury any heavy weed growth.

The flinty macaroni wheats (*Triticum durum*) appear to be grown principally in the drier plains districts. Of these the principal varieties are Deve, Arnaout, and Mavragan. In the damper districts and hills softer varieties are grown, principally Rapsani, Zouliza, and Dimenos or two months wheat. This rapid-growing wheat is always spring sown, ripening its grain at the same time as the winter sown wheats. I have forwarded a small sample of it to Roseworthy. The mower and binder and steam thresher have penetrated here, although the bulk of the harvesting is done with the



Spring Tillage in Greek Olive Groves.

sickle and threshing sledge. The chaffed straw is reserved for feeding horses and cattle. As was formerly the case with us, red rust frequently leads to disastrous losses.

Barley is also very frequently grown, but exclusively the six-rowed variety known to us as Cape Barley. In certain districts it is cut for hay after the flowering stage. I saw several samples of this hay, which appeared to me to have been cut very much later than is the practice with us, for it was white, brittle, and heavily bearded. I cannot say that it compared favorably with our good wheaten or oaten hay. It yields 1 ton to 2½ tons to the acre.

Almost every farmer has a small patch of rye. I could not understand why this should be the case until I was informed that it was used for bands at harvest time. For this purpose rye straw is no doubt excellent.

Beans, chick peas, vetches, lentils, &c., are also grown fairly commonly.

Tobacco forms an important crop, the bulk of which is consumed locally, but some of it is regularly exported. Since 1904 the area has declined from 30,370 acres to 16,036 acres in 1908. Exports have also declined proportionately.

Olive trees are met with almost everywhere, either by themselves or associated with more or less stunted vines. The olive production varies between 25,000 and 50,000 tons, the bulk of which is consumed locally. Olive trees are regularly and carefully pruned, and fairly well tilled. The fruit is harvested by threshing the branches with long, flexible willows, which causes the berries to fall to the ground, where they are picked up. Contrary to the usual practice in some other countries, the olive trees are grafted a considerable distance above ground—as much as 5ft. to 6ft.

Both rice and cotton are successfully grown, although as yet only to a limited degree. If cotton can be grown successfully in Greece, within sight of perpetual snow, why not with us, unless indeed harvesting operations are likely to prove too costly?

Finally, we have important areas under orchards, principally fig trees and citrus trees; and, to a lesser degree, stone and pip fruit. The Smyrna figs have been grown here successfully, although the quality of the fruit is not equal to that of Smyrna. It is said that much of the dried Greek figs go to Austria, where they are roasted, ground, and disposed of as coffee.

The quality of the oranges and lemons is unquestionably excellent—superior, it must be said, to our own. Other fruit I did not have an opportunity to sample. Curiously enough, whilst olive trees and orange trees are generally pruned, apricots, peaches, plums, apples, pears, &c., remain usually untouched.

SHEEP AND CATTLE.

Greece has a source of riches in its flocks and herds, full advantage of which is perhaps not taken. For the most part Greece is a country of short, sweet pastures, adapted mainly to sheep; hence it is but rarely that large herds of cattle are met with. The bulk of the country makes use of goat's milk for alimentary purposes; hence milch cows are not very much in evidence. There do not appear to be any good local milch breeds; and when good milch cows are required they are imported from Switzerland, Odessa, Crimea, and Italy. I had occasion to see some very fine specimens of Swiss cows on a private farm in the neighborhood of Athens. Local cattle are kept mainly for breeding working bullocks, upon which the bulk of farm work falls. They are evidently very poor milkers, yielding barely enough milk for their calves. Of draught horses there are practically none. One meets with small, underbred, ill-fed ponies which, in the matter of draught, are Jack of all trades.

There are not many pigs in the country; they were estimated for me at about half a million. The native pig is in general conformation very little

better than a wild boar. He is leggy, with heavy head, lean flanks, and no hams to speak of. The prevailing color is sandy, although occasionally black and white pigs are met with. I was informed that local pigs lost on dressing on an average 25 per cent. The fact is that Greeks do not appreciate fat pork ; they secure all the fat they need in olive oil.

I have purposely left sheep last because they form the most important and most typical live stock of the country. The flocks of sheep and goats are estimated to total 5,000,000 head. It is perhaps difficult for us to realise their mode of existence. Like the Merinos of Spain they form essentially migratory flocks, changing their pastures with the seasons. In the winter, for instance, they come down into the warmer and more sheltered valleys, whilst the return of summer soon sees them on their way to erstwhile snow-clad peaks. Such a practice implies the existence of vast areas of commonage and open unfenced country. To see the sheep scattered over the mountain sides is a pleasing sight indeed ; nor is it the eye alone that is flattered. The great majority of the sheep are provided with sweet-sounding bells, which in the distance recall the gurgling of running waters over a rocky bed ; and as of old, from the shade of rock or stunted shrub, the watchful shepherd pours forth melodies from the rustic pipe. These flocks are exceedingly tame, and the shepherds appear able to gather them together by their cries. It is not that dogs are wanting ; indeed, there are more than enough of them, as the unwary visitor who approaches the camping ground often discovers to his undoing. These dogs, however, are not sheep dogs in our sense of the term, but merely watchdogs, whose special duty it is to keep off marauders, jackals, foxes, &c. The extreme docility of the flock is exemplified by the fact that they may frequently be seen on the roads following the shepherd and not driven by him.

In the country one sees sheep everywhere, and not always in large flocks. Children may be seen shepherding half a dozen, or a dozen sheep and goats. I have even seen single sheep tethered by a long rope to a picket driven in the ground. I often thought as to the consequences of such treatment to one of our wild station-bred Merinos !

In Greece sheep are exploited principally as milch beasts ; and as, from our point of view, such a treatment is altogether novel, I availed myself of every opportunity to cross-examine the shepherds as to their practices, the gist of which I propose summarising. I must add that through the kindness of Mr. D. Steele, manager of the Kopais Land Co., I was able to visit the temporary settlement of some Wallachian shepherds, by whom I was received with princely hospitality. These shepherds come down in the winter from their snow-clad Thessalian homes into the rich Kopais pastures, where they lead a life of patriarchal simplicity. Similar in type, I imagine, must have been the old Highland clans. It was amusing to note the deference paid to the head of the clan, who, although university-trained, was content to lead

the free nomadic life. We dined with the chief alone, and were assiduously waited upon by minor clansmen. The *piece de resistance* was a lamb roasted whole, and in deference to our prejudices, knives and forks and plates had been secured for us the day before, together with a variety of delicacies supposed to be essential to more civilised but more effete guests. The repast closed with coffee and excellent brandy! But I am wandering, and must return to our subject matter—*moutons*.

There appear to be only two breeds of sheep in the country, or perhaps three, with crosses between them. What I take to be the true Greek sheep is a rather small animal, as are all essentially mountain breeds. I was told that a good average ewe dressed from 29lbs. to 32lbs., and a very good ewe 42lbs. to 48lbs., whilst an average ram would dress 48lbs. to 50lbs., with



A Greek Flock of Milking Ewes.

occasional ones running up to 70lbs. It should be noted that in Greece the dressed weight includes the head, which is not detached. These sheep have generally black or black and white faces, and black legs; the black color frequently extends partly over their bodies, so that a big percentage of them may be described as piebald. Completely black sheep are very frequent, forming, I should judge, fully 20 per cent. of the flocks. The nose is Roman and the face free from wool; indeed, I was told by a shepherd that lambs showing any trace of wool on the face were always sold, the objection being that butchers feared that sheep of this kind had more wool than flesh. There is no wool on the legs, and very little on the belly. The legs are strong, stout, and sturdy, and bodily conformation, from the point of view of butcher's meat, rather poor. The ewes are all provided with excellent udders, being

in that respect more like cows than sheep in our estimate. They are provided with long, thin, rat-like tails that are kept clipped of wool to facilitate milking.

Such, then, is the sheep met with in the mountains ; in the plains one meets with a large, better developed sheep of similar type, in all probability derived from the former.

In addition to these purely Greek sheep the fat-tailed Asiatic sheep is also occasionally to be met with. This sheep is a better butcher's beast, but on the whole less hardy and less able to travel and withstand the hardships of mountain life. Nor does he yield anything like the same quantity of milk as the usual Greek mountain sheep ; hence pure fat-tailed sheep are rarely met with, although crosses in which they enter are not infrequent.



Group of Nomadic Wallachian Shepherds at Lake Kopais.

I was informed by Mr. Chassiolti that various European breeds of sheep have been tested in Greece, but without success. The Larzac—the great French milking breed from the milk of which Roquefort cheese is made—were found inferior to the native breeds. They were not sufficiently hardy, nor did they yield as much milk in similar conditions. Merinos proved quite useless, because of their inability to yield sufficient milk, and the objection of butchers to their dark, strong-flavored flesh. According to Mr. Chassiolti, rams of English breeds—Southdowns, Shropshires—had to be set aside, as they were unable to withstand the heat of the country. Knowing as I do how these breeds are able to thrive under still warmer Australian skies, I have difficulty in accepting this statement. The position is, I believe, that probably nowhere else in the world will there be found a breed of sheep capable of

replacing local breeds so long as milk forms the main source of revenue of a flock.

Notwithstanding the bleakness of the winters, the practice of dropping lambs in the early winter appears to be universal. This I take to be so because the rich summer feed of the mountains is needed for the production of milk as soon as the lambs are weaned off. I very much suspect that the rams run with the ewes the greater part of the year, although I had some difficulty in ascertaining what was actually the practice in this direction. One shepherd informed me that the rams were admitted to the flock in early August; that they stayed there from two to two and a half months, but never more than three months, and that the bulk of his lambs fell in December and January. I asked him how it was that lambs appeared still to be falling in April, the time of my visit. This he attributed to accident, or to ewes having been missed earlier in the season. Another shepherd informed me that the rams ran with the ewes from August to May of the following year; and, judging from the general irregularity of the lambing, I am inclined to think this the general practice. I was told that very early lambs were occasionally dropped in October from strong, well-fed ewes, whilst weaker ewes dropped their lambs in spring; but that, as a matter of current practice, it was always sought to avoid spring lambing.

The lambs are neither tailed nor castrated, and are sold to the butcher when between two to two and a half months old, so that their mothers may take their places in the milking sheds the sooner. At this age they dress from 17lbs. to 20lbs.; and from experience I can aver that the cutlet of a Greek lamb is a little less than an average mouthful, although very sweet withal. I was informed—and could readily appreciate the fact—that if killed at a later age the flesh was inclined to be rank. Lambs that are kept back for the replenishing of the flock are all weaned off when three months old, in the interests of the milk supply.

The milking of the ewes starts in February, when the bulk of the lambs have been weaned off or disposed of. In order to facilitate milking operations the wool of the tail and around the udder is clipped close, and in this condition a flock of sheep present a most peculiar appearance. The milking continues right up to August and September, the milk of these months being very rich if not over-plentiful. The ewes are milked twice a day in rough brushwood yards erected in the pastures. I was informed that 10 average milkers (always men) could milk 800 to 900 sheep in an hour. For a ewe new to the operation two men are needed to enforce the requisite docility. The ewes are milked from behind and not from the side, as with cows. A good ewe will yield about 1lb. of milk a day. The ewes' milk is made into various forms of cheeses, which, when one has become acclimatised to them, are not at all unpleasant. Butter apparently is made exclusively from goat's milk.

The ewes go to the rams as two-tooths, and will carry about six lambs, after which they are fattened and sold to the butcher. Some ewes appear to have sound mouths even at eight years old. One shepherd informed me that he always fattened off and sold the dry ewes of the preceding season : he had found that barrenness was frequently caused by milking the ewes too late in the season. Another shepherd told me that he always kept his dry ewes, even if dry several seasons in succession, because they helped to improve the appearance of his flock.

As to the rams they are first used as two-tooths, when they are allotted 15 ewes each ; thereafter they receive 30 ewes ; although one shepherd told me he always used seven rams to 100 ewes. Old rams are fattened off when five years old and sold to the butcher in the month of May, when it is stated the flesh loses most of its rankness, which I am inclined to doubt.



Milking Enclosure for Ewes in Greece.

Castration of lambs is not practised, as I have already stated. A few ram lambs, however, when 12 months old, are castrated by tying a piece of string round the purse, and are kept as bell wethers to lead the flock. No selection in the matter of ewes appears to be practised. When questioned as to how he selected his ram lambs, one shepherd told me that his first point was good stout legs, his second a typically characteristic masculine head, and his third a good, sound, long fleece.

The flocks pasture at freedom night and day in the summer months, but in the winter, when accompanied by their lambs, they are regularly yarded at night. Salt appears to be appreciated, for one large sheepowner informed me that in winter he gave as much as 28lbs. of salt a day to 100 ewes, which practice led to their drinking very freely. Shearing starts about mid-May.

I was informed that the mountains were free from burs and the seeds of weeds that spoil the fleeces. The shears are very primitive, like a large pair of tailor's scissors. The estimate of shearing records varies very considerably. One shepherd informed me that an average shearer could shear about 35 sheep a day; an expert one about 40; whilst another stated that in eight hours a good man could shear 120 to 130 sheep; three minutes to the sheep, he said, was sufficient. The wool is rather long but exceedingly coarse, more like hair than wool, and the fleece is open and loose. A good ewe will average about 5½lbs. of wool, whilst a good ram will cut from 7lbs. to 8½lbs. The local value of this wool is about 6d. a pound, although occasionally as much as 9d. a pound is realised.

The value of lambs varies very considerably with seasons and opportunities. Instances were quoted me of lambs (two and a half months old) having fetched more than £1 a head; others again state the average value to be 7s. 6d., and others 12s. 6d. One shepherd assured me that his lambing was always 100 per cent.; when pushed he admitted that it might be as low as 95 per cent., but never below. Another frankly admitted that he reckoned 80 per cent. a good lambing. From the above figures I am able to work out the revenue of an average flock as handled in Greece:—Lamb, per ewe, 7s. 6d. to 12s. 6d.; milk, per ewe, 8s. 6d. to 12s. 9d.; wool, per ewe, 2s. 3d. to 3s. 4d.; revenue per ewe, 18s. 3d. to 28s. 7d. The relative unimportance of the fleece value will be noted. I am informed that it is reckoned that the milk pays all expenses of the flock. I am told that with help at milking times one man can manage 500 sheep in summer, and in winter at lambing time not more than 100 sheep.

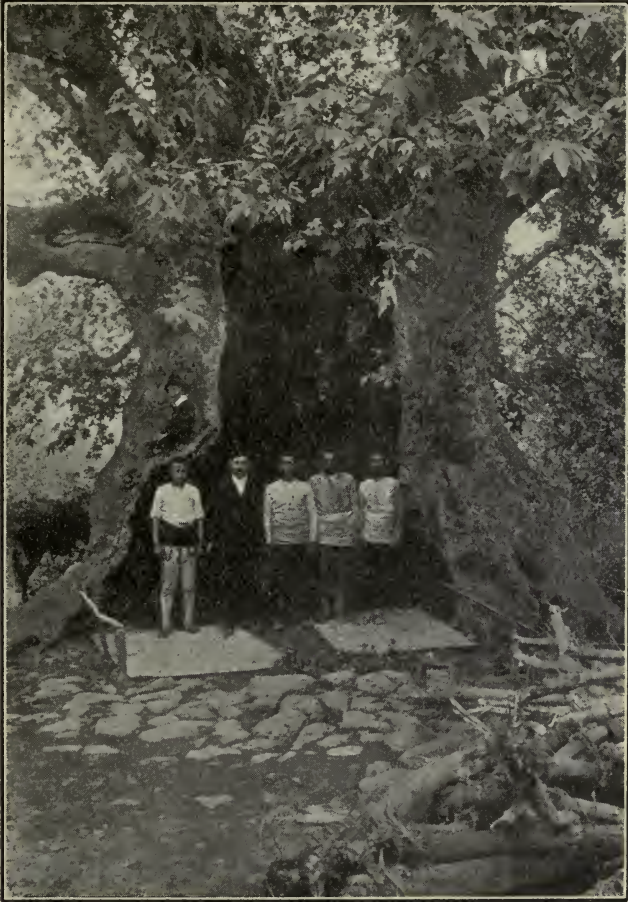
Dips appear to be unknown and the sheep fairly healthy. Fluke and foot-rot are naturally unknown in the mountains. Sheep suffering from scab are painted over with hot oil and sulphur. Hot oil applied locally kills tick. Flyblown sheep are sprinkled over with black pepper and then smeared over with tar.

TURKEY IN ASIA.

My visit to Turkey in Asia was confined to the neighborhood of Smyrna, Boudjah, Bournabat, Bournabashi, and, subsequently, Scutari and Brusa, in the neighborhood of Constantinople.

Smyrna is the centre of the dried fig and sultana raisin industries. Had time permitted I had intended making thorough inquiries into these two industries. As things turned out, this, unfortunately, was not possible. I gathered that the dry fig industry was in a fairly flourishing condition, which

is more than can be said of the raisin industry. Some years back the phylloxera destroyed the Sultana vineyards of Smyrna. At present all the vineyards are grafted on American stock, and it appeared to me that the young growth that I was at the time able to observe was very far from showing that healthy, vigorous appearance so characteristic of the same variety in South Australia.



Secular Oriental Plane Tree at Brusa (Asia-Minor), 50ft. in Circumference at 5ft. from the Ground Level.

Whilst in the neighborhood of Constantinople I had occasion to visit Brusa, the first capital city of the Ottoman Empire. The whole of the neighboring country appears to be almost entirely given up to the silkworm industry, fully three-fourths of the population being, it is stated, either directly or indirectly interested. Plantations of mulberry trees are exceedingly numerous. These trees are either intermingled with olive trees or vines, or more

frequently planted by themselves. It appears the current practice to plant them very closely together (30in. to 40in.), and to maintain them in dwarf condition, presumably to facilitate the picking of the leaves.

The value of bare fallowing appears to be recognised, for I came across many fields in good condition of tilth and receiving at the time their second ploughing.

The principal field crop appeared to be wheat, with occasional fields of barley, rye, beans, and flax. Some of the crops were very creditable; but the majority were either yellow with charlock or scarlet with poppies—quite another poppy from our old enemy: a more gorgeous, strong-growing individual, and apparently equally pertinacious.

I saw some well-grown groves of almond trees, although orchards, as a whole, have here all the appearance of an overgrown jungle or thicket.

The bulk of the ploughing appears to be done by oxen, although buffaloes are to be seen grazing at large in the fields. I believe they are reserved mainly for cart work.

Formerly the bulk of Asia Minor sheep were of the fat-tail breed. To-day the Greek type of sheep appear to be supplanting them. I secured in a butcher's shop a good photograph of the dressed carcass of a fat-tail sheep, which I hope will not prove without interest in South Australia.

From Constantinople I had originally intended going to Tunis and Algiers. I found, however, that I had dallied too long in the East; and decided, therefore, to proceed without delay to England *via* Marseilles and Gibraltar. I propose visiting North Africa later, in November or December.

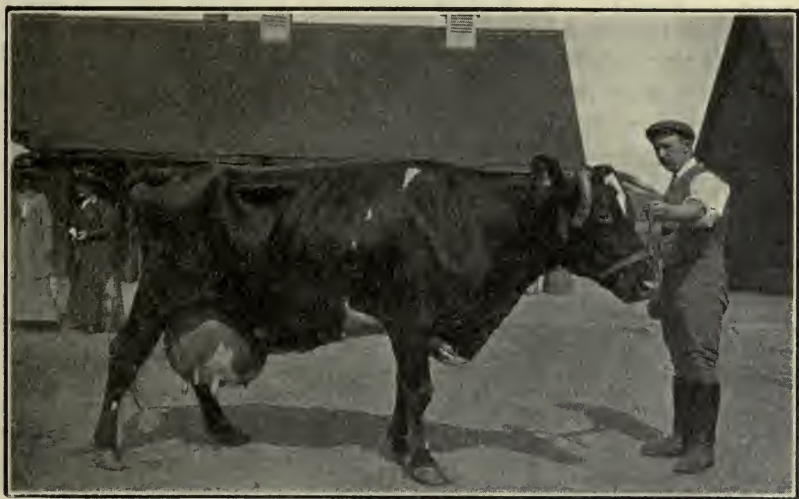
GREAT BRITAIN.

I landed in England on May 21st, and made London my headquarters till June 20th. I found time during this period to visit His Majesty's Estate at Sandringham, the Windsor Farms, Lord Rothschild's Tring Estate, and the Rothamsted Experimental Station. In addition, as directed by cablegram, I proceeded to Gainsborough to examine the agricultural motors of Messrs. Marshall & Co.

At Sandringham I was interested chiefly in the Southdown sheep, the flock being an exceptionally fine and even one. From the funds kindly supplied for the purpose by Mr. Alick Murray I have purchased here for the College 15 two-tooth ewes, which the manager (Mr. F. H. Beck) has consented to put to two very fine rams which I was permitted to select. One of

these rams is, I think, quite the finest specimen of the breed I have seen ; indeed, in my opinion, he was a long way ahead of anything exhibited at the Liverpool Show.

This was my first visit through the country parts of England, and I was considerably surprised to notice how dirty the crops showed up from the railway line. Our old friend charlock seemed to be showing up everywhere : indeed, since then I have not succeeded in avoiding him wherever I have been. I am informed that this is abnormal. It is attributed to the exceptionally wet summer in 1909, which hindered cultural operations. As, however, in the majority of cases in England wheat follows red clover, which is first cut as hay and then grazed, I fail to see the strength of the argument.



Darlington Cranford VI. (12 years old), at Tring.

Unfortunately my visit to the Windsor Farms was not altogether a success. It had been pouring with rain several days in succession, and rained also on the day of my visit. Beyond, therefore, looking over some very fine stabled Shorthorn cattle, I was not able to see much.

I was pleased to have the opportunity of visiting Lord Rothschild's Tring Estate, as it would enable me to see what milking Shorthorns were like. I must say that the latter are very different in type from what we had been led to expect from South Australian examples. I have no hesitation in describing them as magnificent types of dairying animals. I was introduced to one cow—Darlington Cranford V.—which, according to Mr. Richardson Carr, Lord Rothschild's agent, yielded a quarter of a ton of milk a week, notwithstanding the fact that she was 12 years old. Her son and grandson—Conjuror and Ranger—were two magnificent examples of dairy bulls.

Lord Rothschild is also the owner of a very fine Jersey herd. One cow—Gauntlet VI.—gave nearly 2lbs. of butter a day from 41lbs. of milk.

As an admirer of the work of Lawes and Gilbert, I very naturally made my pilgrimage to Rothamsted, where I was given every facility to look over what had been and was still being done. The plots are still continued on the lines that the writings of Lawes and Gilbert have rendered so familiar. The laboratories and sample-rooms were also full of interest to me. New lines of experimental work are being opened up, and there is no doubt that the work initiated here early in the nineteenth century by Sir John Bennett Lawes is being continued in a manner that he would approve of.

THE NATIONAL SHOW.

The Show of the Royal Agricultural Society was held this year at Liverpool, between the 21st and 27th of June. I attended the show on four consecutive days, but in view of its vastness and complexity I found myself unable in this time to do more than go thoroughly over sheep, cattle, and heavy horses, and cast a rapid glance over farm machinery exhibited.

Before entering upon details let me say that one of the leading features of the show, if one were to judge from the constant stream of visitors attracted to them, were the advertising booths of Canada and of British East Africa. With true insight into the proclivities of the average Briton, the British East African exhibit consisted almost exclusively of trophies of the chase: the natural moral being—Who would not go to a country where such game was to be seen from your back door? Canada dwelt more on the opulence of her resources, and proved almost equally attractive to visitors. I was struck by the fact that the stream of visitors to these two booths consisted almost exclusively of the rural type—that is to say, the type of settler most in demand in new countries. Victoria and Western Australia also shared a booth in common; they did not, however, appear to share the popularity of the other two. The rest of Australia was conspicuous by its absence. It appears to me that if we are at all desirous of attracting rural settlers from the old country the numerous shows held throughout its length and breadth should form excellent advertising media.

My first day at the show was given over to sheep. Of these there were representatives of 24 breeds, many of which were quite new to me, and others with which I had been formerly familiar had undergone manifest improvement.

As South Australians in general are not familiar with many of these breeds I shall summarise below a few notes on each, which I had occasion to put together in the course of my examination of the several pens.

Oxford Downs.—Not a very large exhibit, represented by about 50 pens of sheep. These appeared to me as the best all-round sheep of the show, with the exception, perhaps, of the Suffolks. They are fine, large, compact sheep

with good all-round conformation, and without any suggestion of coarseness. They carry fine, sound, useful fleeces. I am surprised that they should not have been availed of more freely in Australia. They should prove magnificent mutton sheep in good pasture country.

Shropshires.—Shropshires are too well known in Australia to call for any comment on my part. They formed by far the largest exhibit in the show, being represented by 118 pens. The prices secured for rams at some of the auction sales appeared very satisfactory. On the whole, it appears to me that Shropshires acquire greater size in South Australia than appears to be the case in Britain. I might add that with this breed the tendency to wool-blindness is as common here as in Australia.

Southdowns.—A relatively small exhibit, represented by 65 pens. In view of the fact that, thanks to the generosity of Mr. A. J. Murray, I was com-



H.M.'s. Southdown Flock at Sandringham.

missioned to purchase some of these sheep for Roseworthy, I went over the show exhibits very carefully. I must confess to having experienced a certain amount of disappointment over them. I have since had occasion to inspect some of the leading flocks at their homes, and I am compelled to the belief that the best types of the breed were perhaps not to be seen at the Liverpool Show.

Hampshire Downs.—Represented by 56 pens of sheep. A coarse, heavy-looking sheep; inclined to be leggy, and with large, heavy head. I was not attracted by this breed, and, judging from the appearance of the younger exhibits, they do not acquire any beauty of form until wellnigh to maturity.

Suffolks.—Represented by 23 pens of sheep. A very fine class of sheep, and likely to be useful in Australia, either as mutton sheep in good pasture

or for crosses with Merino. They are more finely built than the Hampshires, with lighter head and bone, and with more active, sprightly carriage. As a breed they appear to me to lack somewhat in compactness.

Dorset Horns.—Sparsely represented by only 19 pens of sheep, and these by no means very meritorious. I have seen finer Dorset Horns in South Australia.

Ryeland.—Represented by 17 pens of sheep. The breed appears to me a promising one. Well built from the point of view of mutton, and well woolled throughout.

Kerry Hill (Wales).—Represented by 17 pens. Medium size sheep, with white faces blotched with black. Narrow chested, flat-ribbed sheep; not likely to be of much value to us.

Lincolns.—Represented by 51 pens of sheep, including some very fine animals. I think, however, that I have seen them equalled in Australia.

Leicester.—Represented by 21 pens of sheep, the great majority of which were very attractive.

Border Leicesters.—Represented by 30 pens of sheep. This breed is, I believe, popular in certain portions of Scotland. On the whole, however, it is too leggy to prove attractive.

Wensleydales.—Represented by 24 pens of sheep. A large, rather slackly-built breed, with heavy blue-grey face with topknot. These sheep may have their merits. I was not, however, attracted by their appearance.

Derbyshire Grüstone.—A fairly well developed medium-sized sheep, with black and white face and points; represented by 14 pens. Does not appear likely to be of much interest in Australia.

Lonks.—A large breed, with horns in both sexes. Rather heavy, uncouth sheep; of no probable interest to us.

Romney Marsh.—Well represented by 81 pens of sheep, the bulk of which were a credit to breeders. This breed is also well known in Australia, and is, perhaps, deserving of greater popularity than it has hitherto succeeded in securing.

Cotswolds.—Reputed one of the largest of British breeds, and represented by 29 pens of very fine sheep. I have never heard of their importation to Australia, although I understand that they are well liked both in Canada and the United States.

Devon Longwool.—Represented by only five pens of sheep. Appear smaller and more compact than the South Devons, but otherwise similar.

South Devons.—Represented by 19 pens of sheep. Large, leggy sheep, with plenty of barrel length; white, hornless face, with short, drooping ears. The lambs are unattractive, and apparently slow developing. Of no probable interest to us.

Dartmoor.—Represented by 15 pens of sheep. Very large, leggy sheep, standing exceptionally high. Of great length of carcass, but generally

lacking in depth, and inclined to be flat ribbed. Heavy, hornless, white head, blotched with black ; points white ; wool curly and lustrous. Of no interest to us.

Exmoor.—Represented by 18 pens. A medium size very compact sheep. They are exceptionally broad, and well built. The rams carry heavy horns, very like those of the Merino in appearance, whilst the ewes carry narrower light horns. These sheep have a distinctly aquiline profile, and, like Merinos, are woolled all over, including legs and purse. The nostrils are black, and the face reddish. I hesitate to say anything as to their possible value to us, as I cannot claim sufficient knowledge of them.

Cheviot.—Represented by 11 pens of sheep, all from the same breeder in Northumberland. Later on I had often occasion to admire the picturesqueness of the Cheviots in Scottish fields. At Liverpool they were shown in the wool, and had not been tailed. They are relatively large sheep, with great carcass length. Their faces are china white, with a crest of wool at the back of the head. The profile is aquiline. The ears are long, and mobile, and carried erect, giving the head almost a hare-like appearance. There are occasional black spots in the ears. Although the breed is reputed to be hornless, almost all the rams I examined had short stubs of horns.

Herdwick.—Represented by 12 pens of sheep. A breed, I believe, restricted almost exclusively to the high hilly pastures of Westmoreland and Cumberland. I am told that this breed is exceptionally hardy ; that it will thrive where no other breed can live. It may be so, but, judging from the specimens I had occasion to see later on in Westmoreland and Cumberland, hard times have frequently had the effect of stunting these sheep to a ridiculous degree. The breed is small and active looking, always on the alert ; short-legged and close to the ground, and generally abnormally pot-bellied. Their general appearance is very unprepossessing.

Welsh Mountain Sheep.—Represented by 32 pens, and by far the most attractive of the mountain breeds. On the whole, long in the barrel and short in the leg. Rams alert and handsome, horned, and with white faces and legs. Ewes showed a tendency to sandiness in face and points. Inclined to slackness in general build, and flat ribs. Rams generally compact and sturdy, with horns curling back, but not spreading, which gives a narrow appearance to the head. Not tailed.

Black-faced Mountain Sheep.—Small sheep with short legs. Black faces blotched with white and black points. Horns in both sexes ; broad and powerful in rams, and narrow and spreading ewes. Like all mountain sheep, not attractive in appearance—especially after shearing, which in the Highlands at all events is carried out in the most perfunctory manner. I saw some sheep from which one would have said that the wool had been torn off in handfuls.

CATTLE.

Shorthorns.—Out of a total of 826 cattle entries 349 were represented by Shorthorns—that is to say, over 42 per cent. of the total entries. Beyond this fact a visitor to the show could not but be struck by the extent to which genuine farmers tended to cluster round the Shorthorns, whilst other sections were left very largely to casual visitors. That the exhibition of Shorthorns was magnificent cannot be denied. To me these cattle did not appear to have been fattened up to the abnormal extent that we have been accustomed to in the Adelaide and Melbourne shows. They were sufficiently fat to show off their wonderful symmetry of form, but not to the extent of practical



"Daisy Queen"—1st Three-year-old Shorthorn Cow at the 1910 Show of the Royal Agricultural Society at Liverpool.

deformity. That in aiming at the production of beef-producing animals the milk-producing capacity of the breed has been very considerably impaired has not been lost sight of by the English farmer. On all sides I heard it stated as the opinion of apparently competent men that the introduction of Scotch bulls to English herds had had the effect of ruining the dairy industry. The show authorities themselves have not been slow to recognise the turn of the tide, and numerous prizes are offered for both bulls and cows of good dairy strains. I notice in this connection that bulls competing in these sections must have sprung from dams having secured a certificate of merit in a milking trial or test, or in classes set apart for pedigree dairy Shorthorns. From what I have been able to see there is no doubt that in the capable hands of English breeders the Shorthorns are rapidly acquiring

that dual purposedness that appears to be essential to modern conditions of farming.

Lincolnshire Red Shorthorns.—This breed, which was represented by 39 entries, appeared to me to include some magnificent dual-purpose beasts. These cattle are exceptionally large and well proportioned, whilst most of the cows had magnificent udders. In color they are a whole red.

Herefords.—Represented by 77 entries, and coming therefore third in the list of importance. One could not help admiring this breed for its general beauty of appearance. Most of the cows, however, were sadly deficient as milk-producers.

Devons.—Represented by 25 entries. I see much to admire in this breed that is not commonly met with in Australia. Whole red in color, the cows have fine spreading lyre-shaped horns, whilst the bulls have stout uprising ones. The beef conformation is certainly magnificent, whilst the majority of the cows had the appearance of good milkers.

South Devons.—Represented by 25 entries. Very large, all-red cattle, with horns between the Shorthorns and Devons in size and type. The cows appeared good milkers. Heifers and young bulls were generally more or less lanky and gawky—a clear evidence of relatively slow development.

Longhorns.—Represented by 16 entries. Large cattle, with long, drooping horns, not unlike the tusks of a young elephant. Black and white, or red and white in color; generally with a symmetrical white line along the spine. Beef conformation only moderately good. Many cows should prove good milkers.

Sussex.—Represented by 24 entries. Whole dark-red in color, with horns of moderate length. Carcass development good, but cows not likely to make good milkers.

Welsh.—Represented by 21 entries. Medium size all-black cattle. Bulls with short, sturdy horns; cows with narrow horns, recalling those of the Devon. Cows always show a little white in the neighborhood of udder. Moderately well developed for beef, but not likely to make heavy milkers.

Red Polls.—Represented by 47 entries, and, on the whole, a very fine section of the exhibit. The majority of the cattle exhibited were a good bit darker red than we are accustomed to in South Australia. One might almost call them "black-reds." All were characterised by a pronounced orange ring round the eyes. The cows were all excellent milkers, or showed very good beef conformation.

Aberdeen-Angus.—Represented by 44 entries. This class is characterised by truly marvellous beef development; in this direction I suppose it stands quite apart. The reverse of the medal, however, is the condition of the cows, whose udder it would need a microscope to discover. How some of them can rear their calves is more than I can understand. Whilst full-grown beasts are whole black, calves and younger beasts frequently show ruddy tints, whilst one calf was as red as a Red Poll.

Galloways.—Represented by 16 entries. Another black, hornless breed. Smaller generally than the Aberdeen-Angus, and with an abundance of coarse hair on the poll. Good beef development, and better dairy appearance than the preceding breed.

Highland.—Present only as curiosities. A rather small breed of whole-red cattle, with long horns and an abundance of shaggy hair.

Ayrshires.—Poorly represented by 10 entries. I cannot say that I was impressed by this section. I have seen better types of the breed in Australia. There were only two bulls exhibited, and these lacked masculinity, and were altogether steer-like in appearance.

Jerseys.—I was surprised to find that amongst cattle Jerseys, with 88 entries, should come second in the list in importance. I must state, without reservation, that the exhibits of Jersey cows were simply magnificent; it is questionable whether a more attractive lot of milkers could have been got together. The udder development of some was extraordinary. In the bulls generally I was disappointed. The great majority of them were inclined to have a steery appearance; and not one, to my mind, was the equal of Black Antimony.

Guernseys.—Represented by 23 entries. In color for the most part red and whites. This breed is considerably larger and coarser than the Jerseys, and have every appearance of good milkers.

Kerry.—Represented by 19 entries. All-black, medium-size cattle. Bulls, with medium-size short horns; cows, with fine spreading horns, recalling those of Ayrshires. Horns generally white, with black tip. Cows have the appearance of fair milkers.

Dexters.—Represented by 40 entries. Small, all-black cattle, some cows carrying magnificent udders. Red occasionally present as a color. In this instance the champion cow was red.

HORSES.

I was able to admire the heavy horses on parade. Time did not permit of my seeing the light horses. The heavy horses were represented by Shires (86 entries), Clydesdales (78 entries), and Suffolks (25 entries). Additionally there were exhibits for draught geldings and for draught horses in harness. I was much impressed by the Shire exhibits. The champion Shire stallion was certainly the finest draught horse I have ever had the pleasure of seeing. Beside the Shires the Clydesdales had an almost weedy, slack appearance. Some of the Clydesdale brood mares were very fine. Suffolks formed very handsome exhibits; all very fat and very showy, but very few, in my view, form the ideal draught horse.



A Shire Sire at Sandringham.

PIGS.

On the whole I was disappointed in the pigs. We could easily have shown against them without suffering by comparison.

Large Whites.—Represented by 94 entries. A very fine class; perhaps the finest in the show.

Middle Whites.—Represented by 57 entries. Also a good class; approaching more closely in size the type of pig found most useful in Australia.

Tamworth.—Represented by 54 entries. A fine class; an improvement on anything I have seen in Australia in this breed.

Berkshires.—Represented by 62 entries. On the whole I was not much impressed by these exhibits. There were, however, a few very good sows.

Youngsters generally poor. The judges appeared to pay very little attention to the recognised markings and color of the breed. Sows with white ears took prizes; and many prizewinners were splashed with white right up their legs.

Large Blacks.—Apparently a very popular class here, because of their size—some fine monsters exhibited. I noticed that some boars carried quite a quantity of hair.

Curly-coated Lincolns.—This was my first introduction to this breed, and I cannot say that I was much impressed by it. They are white pigs, exceedingly unwieldy in size, and covered with a thick, curly coat of hair. They are, to my mind, too large for Australian requirements, and if a large pig is needed the large white appears to me superior.

AN ENGLISH AGRICULTURAL COLLEGE.

I paid a visit to the Cirencester Royal Agricultural College in June, 1910. At this institution I was received very kindly by the principal and staff and shown over all there was to see. I suppose on such an occasion it is only natural that a comparison with the institution with which I have been connected for close on 20 years should arise in my mind. I feel, however, that criticism on my part would not be justified. The conditions which Cirencester and Roseworthy are respectively meant to meet are so intrinsically different that any comparison between the two would, to my mind, be exceedingly unfair. I shall, therefore, content myself with stating that an institution conducted on the Cirencester lines could not possibly thrive in Australia. The Principal pointed out to me that the students were drawn exclusively from those ranks of society who do not need to do manual labor of any kind, and who, in the majority of cases, do not wish to take part in manual labor. It is evident in such circumstances that the training imparted must differ radically from the training imparted at Roseworthy; and the fact that the institution is, as I was informed, very well patronised would appear to suggest that it meets the requirements for which it was brought into existence. Students' fees vary from £130 to £170 per annum, according to the style of residence allotted. These fees, according to the principal, were moderate when compared with average public school fees. One-half of the students, however, are non-resident.

Instruction imparted at Cirencester is almost entirely theoretical. There are only a few acres of land attached to the college, and the bulk of it is taken up with very nicely laid out grounds. Naturally there is but little room on this diminutive area for college-owned live stock. I counted, I believe, 12 head of cattle, 20 to 30 sheep, two or three horses, and a dozen pigs recently purchased in the market for fattening purposes. Farm buildings and workshops are of the most meagre description, although no doubt amply adequate to the calls that may be made upon them.

On the other hand, the college has a right of entry into a neighboring farm for purposes of instruction ; for th's privilege they pay what may be termed a capitation grant regulated by the number of students in residence. Thus students do not take part in farm work, nor have the college authorities the advantage of working a farm on the lines that they might recommend to students. The practical training of students, therefore, is restricted to the observation of the success or failure that follows the efforts of a neighboring farmer.

It should be noted that the institution labors under difficulties that are not of its making. It receives no grant-in-aid, and is burdened by a heavy ground rent ; hence, any reduction in fees, even if it were desired, would spell ruin, and attempts at improvements involving the outlay of capital must prove exceedingly difficult.



Royal Agricultural College, Cirencester.

Whilst at the college I was very kindly shown over the farm of Mr. Russel Swanwick, to which have access the staff and students of the college. I wished particularly to see the Berkshire pigs bred on the farm, as several representatives of the herd have found their way into Australia, and some of them are to be found in the pedigree of the Roseworthy College pigs. At Roseworthy, since the introduction of this blood, we have frequently been troubled with white body splashes and otherwise badly marked pigs. I can now understand why this should have been the case. In many respects Mr. Swanwick's herd is a fine one. I noted, however, with surprise that several of the brood sows were badly marked—sows which I should have had no hesitation in sending to the butcher as porkers.

AGRICULTURE AT CAMBRIDGE.

On July 6th I transferred my headquarters to Cambridge, and I may say that I soon found myself in most congenial atmosphere, an atmosphere that has, I believe, been created within recent years by a handful of enthusiastic workers. The Cambridge University has recently taken over a farm to be worked in connection with its agricultural courses, which I think must do much towards heightening their efficacy. The farm is as yet quite new and in the make, and there is little, therefore, that can be said on the subject in the way of criticism. I had occasion here to visit the plots of crossbred wheats that are being raised by Professor Biffen. He is laboring hard after a rust-resistant, strong flour wheat suited to British conditions.

From a perusal of recent Cambridge literature I had come to the conclusion that at Cambridge what is known as the Mendelian theory had become something like an obsession. When in the midst of the keen Cambridge scientific agriculturists I realised that I had not been mistaken. One is apt to find every natural phenomenon explained on the lines of this theory until we may look to it for a solution of the riddle of the universe. Far be it from me to deny to this theory all value; nevertheless, I think that it is being very much ridden to death.

On the Cambridge farm I made the acquaintance of two Merino rams that had come all the way from Australia, and very much fish out of water did they appear. They are being used for certain experiments in crossing on Mendelian lines; indeed, I had a look over some of the first crosses out of Shropshire ewes. They were not unlike, on the whole, some of our crossbred lambs out of Merino ewes by Shropshire rams. Results of scientific interest may perhaps arise out of these experiments; I doubt, however, their value in actual practice.

Whilst at Cambridge I had the pleasure of meeting Mr. A. Henry, in charge of the University Forest Département. I enjoyed his enthusiasm, and made note of some suggestions of his as to possibly suitable forest trees for South Australia. Among these he mentioned the yellow pine (*Pinus ponderosa*) of the Western United States, which, according to him, is both drought-resistant and adapted to relatively poor soils. Equally suitable, according to Mr. Henry, is a Mexican pine (*Pinus ayacahuite*), *Cupressus arizonica* of Arizona and California, and the Algerian ash (*Fraxinus angustifolia*).

WOBURN EXPERIMENTAL FARM.

From Cambridge, by invitation of Dr. J. A. Voelcker, I was able to run down to Woburn and inspect the experimental work conducted there under the auspices of the Royal Agricultural Society. The field work was exceedingly interesting. I was very much struck with the effects of the continuous use of sulphate of ammonia in light soil of this character. The wheat plots thus

treated were absolutely barren, and have been so for some years past; practically nothing grows there except spurry (*Spergula arvensis*). Dressings of lime appear to have a counteracting influence in sweetening the soil.

I was surprised to note the thickness of the young turnip crops, and learnt that as much as 3lbs. to the acre is considered an average sowing, which is probably three to four times as much as should ultimately be needed. Thick seeding is adopted, I was informed, as a protection against the turnip fly, which is apt to work havoc among the young plants. Turnips are thinned out with a broad hoe about 8in. wide, the fingers never being called into requisition. I admired the practised skill with which the workmen did this deftly and neatly, and without injuring the plants that were retained.

In this district wheat is said to follow mangels with success. This is a sure indication that the latter must ripen very early to give time for suitable preparation of the soil for wheat. There is no doubt that in the majority of cases recently pulled mangels leave the soil far too open and loose for wheat. According to the farm manager at Woburn (Mr. Hogg), seven years' experience has shown wheat not to succeed as well after tares as after mustard and rape. As this is contrary to usually accepted views, I have thought it worth while noting so far as Woburn is concerned.

THE LAKE DISTRICT.

On July 11th I left Cambridge for Westmoreland and the English Lake District, where I remained until the 19th. The sheep of the district are mostly Herdwick, or, in the richer pasture, half-bred Leicesters. The Herdwicks are most unprepossessing looking animals—small, undersized, pot-bellied, and generally of stunted appearance. I was informed, however, that no other sheep can live in these parts; the winter is too severe for them. It might be suggested that they follow the example of the Greeks and Spaniards, who winter their sheep on the plains, leading them back to the mountains with the return of warm weather.

Mr. Pattinson, who is a member of the governing body, was kind enough to motor me over to Rigg Newton, a farm school kept jointly by the counties of Cumberland and Westmoreland. I was very much impressed with the neat and tidy way in which this little farm is managed. The dairy herd consisted mostly of unregistered Shorthorns. One cow is said to have yielded over 1,000galls. of milk three years in succession, never testing less than 3 per cent. and often 4 per cent. As an indication of the trend of public opinion I here heard it stated that the Scotch Shorthorns had ruined the dairying industry of Great Britain, which explains the growing popularity of the new milking strains. The flock consisted of various crossbred ewes, mostly Herdwick and Border-Leicesters. They had been put to Down rams for fat lambs.

According to Mr. Lawrence the following is the rotation most in use in the district :—First year, roots (turnips or mangolds) ; second year, oats ; third year, seeds (consisting usually of red clover, alsike clover, rye grass, cocksfoot, and timothy). The seeds are cut once for hay, aftermath grazed ; fourth year and sometimes fifth year, grazing ; fifth or sixth year, lea oats.

This represents, therefore, a five or six years' rotation according as the sown grasses are grazed one or two years in succession. The bulk of the manuring is placed at the head of the rotation to the root crop.

Mr. Lawrence stated to me that after many years' experiments they had found the following dressing of purely artificial manures to be the most profitable for the turnip crop :—1cwt. of nitrate of soda, 2cwts. of kainite, and 5cwts. of superphosphate to the acre, representing a total cost of 29s. 6d. to the acre. The usual practice of the district, however, consisted in the use of 12 tons of farmyard manure and about quarter of the dressing of artificials indicated above.

On July 19th I set out for Scotland, where I remained until August 9th. Unfortunately it rained almost continuously throughout my stay, and of field work I was able to do very little.

THE DUMFRIES SHOW.

On July 21st I attended the Dumfries Show of the Highland Agricultural Society. I was unfortunately compelled to examine and admire the exhibits from the shelter of my umbrella, with my feet for the most time in a quagmire. Long use of this delightful weather enables the natives to accept the position with philosophy. I am conscious, however, that it may have served to prejudice me somewhat against the exhibition as a whole. Whatever the case may have been, my general impression was that the Dumfries Show, both in point of numbers, variety, and general excellence of exhibits, fell far short of the Liverpool Show of the Royal Agricultural Society.

After going through the magnificent exhibition of Shorthorns at Liverpool, I was disappointed with this exhibit, particularly as I had been led to expect great things of the Scotch Shorthorns. I did not see a single animal that stood out, except perhaps a young bull that took first for bulls calved in 1909, and appeared to me very promising. I have no fault to find with the Aberdeen-Angus exhibits ; as a whole they were excellent, and for the most part in the pink of condition. First and champion bull, 3½ years old, was a magnificent specimen of the breed. I was also highly impressed with some of the heifers that were not, however, very high up in the prize list. There were 43 Aberdeen-Angus exhibits. Some of the Aberdeen-Angus cows had ruddy, if not red, calves at foot.

The Galloways were represented by 57 entries, and constituted a very creditable exhibition. This breed, which is smaller than the preceding

one, and with better dairying aptitude, is, I was told, acquiring a good degree of popularity.

The shaggy Highland cattle are, I suppose, more ornamental than useful, although I have no doubt that they could not be replaced with any degree of advantage in the rough country to which they are confined. The 46 entries at Dumfries made a most picturesque exhibit, and indeed I saw several Highland cows with bags that would put to shame many an ordinary dairy cow.

There were 59 Ayrshire entries. As at the Liverpool show, I was impressed with the fact that the bulls appeared to lack masculinity and had an almost steer-like appearance. Does selection in the direction of heavy milk pro-



Champion Clydesdale Mare at the 1910 Show of the Highland Agricultural Society at Dumfries.

duction have this tendency? If so, it is certain that in the end it will prove prejudicial to the breed.

The draught stock was represented by 161 entries, including geldings, all of which I took to be Clydesdales, although it was not expressly so stated in the official catalogue. As at Liverpool, where they were, perhaps, inadequately represented, I was again disappointed in the Clydesdales as a whole. They appear to me to lack in massiveness and compactness, to be loosely built, slack, and even at times, flat-ribbed. If there is nothing better to be seen in Great Britain than what I saw both at Liverpool and Dumfries,

I must confess that I shall return to Australia a convert to Shires, although I am inclined to give the preference to the much-improved French Percherons.

Of horses, there were in addition 130 hunters, not of superlative merit, 35 hackneys, 9 ponies, 21 Highland ponies, and 49 Shetland ponies—the latter a most attractive exhibit of its kind.

There were 85 Blackface sheep entries, making a very fine exhibit. As a breed they appeared to me much superior to the Herdwicks, to which the men of Cumberland and Westmoreland appear so attached. The 37 Cheviot entries, with their brilliantly white faces, their erect ears and their hare-like heads, made a very good impression. They also have the appearance of exceedingly fine sheep. Border-Leicesters, represented by 103 entries, were perhaps the finest sheep exhibit on the grounds.

To me the surprise of the show was to find amongst the sheep a special class, labelled simply "Half-bred," including both rams and ewes, and which on examination I came to the conclusion to be crosses between Cheviots and Border-Leicesters. What could such a class possibly be doing in an agricultural show? They were admittedly fine, upstanding animals, but why offer prizes for half-bred rams? For what purpose can they possibly be used? Unfortunately I could come across nobody who could enlighten my ignorance.

Down sheep were represented by 8 Shropshire entries, very far from first-class; 10 Oxford entries; and 20 Suffolk, somewhat better.

Of pigs, there were 37 Large White and 17 Berkshires of medium quality.

A VISIT TO IRELAND.

August 10th to 16th was taken up in a hurried visit to Ireland, during the course of which I collected no agricultural news. If one were to judge from what can be seen from a railway carriage, Ireland has from an agricultural point of view, a very neglected appearance, in striking contrast to the well-tilled fields of Scotland and England. Ditches everywhere, overgrown, unkempt hedges dividing up the country into the smallest of fields; but the geniality, the cordiality of the people high and low, cannot be equalled anywhere. Why wear yourself out in toil when all's well in the best of all possible worlds? Nowhere have I seen horses better tended, better groomed, than in Ireland. There appears to be no doubt that the Irishman loves his horse; indeed, as I found later on, Irish horses have acquired quite a reputation on the Continent in general. On several occasions and in various countries I have heard a typically well-bred horse referred to as equal to a thoroughbred Irish horse.

Whilst in the neighborhood of Killarney I had occasion to admire some very fine types of Kerry dairy cattle. I am persuaded that we have here a breed that might with advantage be used more extensively in Australia, at all events in those portions of it blessed with a fair rainfall.

I wish here to place on record my great indebtedness to the Agent-General and his office. To Mr. Whiting in particular I am under a personal debt of gratitude. There appeared to be nothing that he was not prepared to do for a stranger.



Kerry Cows at Killarney.

FRANCE.

I was in France from September 6th to October 14th, visiting successively as centres Paris, Avignon, Marseilles, Montpellier, Certe, Carcassonne, Bordeaux, and Bayonne. Whilst these various towns were my headquarters, I availed myself of the opportunity to make excursions in their immediate neighborhoods. I should have liked to have been in a position to visit other centres, but, unfortunately, neither the time nor the means at my disposal permitted of this.

THE FRENCH MERINOS.

Whilst at Paris I endeavored to visit the Institut Agronomique and the Grignon Agricultural College. Unfortunately, at the time, both of these institutions were in recess, and on arrival I was greeted by the concierge—sole officer left in charge. I was more fortunate at the Bergerie Nationale of Rambouillet. Here, at least, I was very courteously received by the manager, and shown over the stud Merinos. The relatively great age of this State institution may be gauged by the fact that I was able to see there the 122nd, 123rd, and 124th generations of sheep bred directly from Merinos imported originally from Spain. The Rambouillet Stud Farm originated in 1786 with the presentation by the King of Spain to Louis XVI. of France of 334 ewes,



Inbred Rambouillet Merino Rams of the 123rd Generation at the "Bergerie," near Paris.

42 rams, and 7 bell-wethers. Those selecting the sheep are said to have received instructions from the King to get together some of the finest types of the breed to be found in Spain. A second importation took place in 1800, but since that time the Rambouillet Merinos have been bred continuously without the introduction of new blood. The flock has all the appearance of vigor and health, and does not in any way appear to have suffered by this prolonged period of inbreeding. I must say that I was very favorably impressed with the general bodily development of these sheep. As mutton sheep they appeared to me to be superior to the South Australian bred sheep. They are more compact and blocky, with broader and deeper chests; the

legs are set wide apart, the ribs well sprung, the backs level, and the legs relatively short and stout. They carry a leg of mutton superior to that carried by our own Merinos. They are not, of course, plain-bodied sheep, but carry very pronounced neck-folds, and occasional body-wrinkles, but not in the exaggerated style of the Vermonts. The wool is on the fine side, but showing practically no yolk at the time that I examined it. I was not able to form any idea of the length of the staple, as the sheep were not in full fleece at the time. The manager, however, informed me that the rams averaged from 20lbs. to 22lbs. of wool. I was anxious to know what might be the average carcass weight of a wether: the manager, however, informed me that he was without experience in the matter, as they very rarely killed any on the premises. He was of opinion, however, that the carcass weight would vary between 100lbs. and 120lbs. I am inclined to think, however, that he was in error, as it did not appear to me likely that they would kill at more than 80lbs. to 90lbs.

The Rambouillet flock, which has continued State property ever since its initiation, is kept exclusively for the purpose of rearing Merino rams, which are sold by auction to private owners. At the time of my visit the flock consisted of about 750 sheep, 500 of which were ewes.

When comparing these sheep with our own there is one point that must not be lost sight of, and that is that for over 120 generations these sheep have been very largely house-fed, and, from our point of view, more or less pampered. It is more than probable that under average South Australia conditions they would be found to lack stamina and constitution. I found the rams to be housed in roomy closed buildings, with an abundance of litter; whilst in fine weather they are given access to neighboring yards, in which they are permitted to sun themselves. Whilst I was examining the rams I overheard the manager and shepherd discussing the advisability of opening or closing certain windows which might expose the sheep to dangerous draughts. The fact of the matter is that the climate of Paris can hardly be described as an ideal one from the Merino point of view, and it is a matter of surprise to me that they should have continued in good health for over a century.

I was pleased to have the opportunity to look over this flock, if only for the fact that it afforded a clear demonstration that the Merino admits of being converted into a far better mutton sheep than is usually thought in Australia, and this without unduly sacrificing the wool. I have always held that so soon as we shall have produced strains with better bodily development than at present obtains we shall have in the Merino the ideal farmer's sheep, just as at present it is the ideal grazier's sheep.

As I had occasion to observe later on, there is no doubt that the Rambouillet Merino is now a vast improvement on the original Spanish Merino. The following figures, taken from the work of a former manager of the Bergerie,

will serve to show the extent to which the flock has varied over the course of a century:—

Average Weight of Ram Fleeces.

Year.	Number of Fleeces Weighed.	Average Weight of Fleece. Lbs.
1794	99	7.48
1800	26	9.35
1804	45	9.46
1834	107	12.23
1838	49	11.22
1847	12	12.14
1851	4	12.20
1869	67	14.64
1877	79	16.74
1887	138	17.27

Average Live Weight of Rams.

Year.	Number of Rams Weighed.	Average Weight of Rams. Lbs.
1802	4	144.1
1847	12	209.1
1851	4	176.3
1869	7	188.26
1877	15	182.3
1887	56	163.9

Data as to Quality of Fleeces.

Period.	Length of Staple. In.	Serrations to the Inch.	Diameter of Fibre. In.
1787-1796.....	2.20	..	38.9 .. 0.00085
1797-1806.....	2.34	..	43.5 .. 0.00084
1807-1816.....	2.30	..	41.5 .. 0.00080
1817-1826.....	2.22	..	42.4 .. 0.00078
1827-1836.....	2.13	..	41.4 .. 0.00080
1837-1846.....	2.18	..	44.2 .. 0.00080
1847-1856.....	2.36	..	42.0 .. 0.00082
1857-1866.....	2.29	..	41.6 .. 0.00087
1867-1877.....	2.61	..	40.0 .. 0.00089

Thus these tables show that during the course of a century the live weight and fleece of the Spanish Merinos have been considerably increased at Rambouillet, and that at the same time the length of staple has been added to without appreciable loss of character and fineness in the wool.

IN SOUTHERN FRANCE.

On September 22nd I left Paris for the south of France, stopping first for a few days at Avignon, at one time the capital city of the exiled popes, now the centre of an important vine-growing district. To a lesser degree the neighborhood is addicted to the growing of what the French know as "primeurs" for the larger centres; that is to say, early vegetables, fruit, flowers, &c. In this direction, however, improved methods of oversea carriage have served to render Algeria, with its warmer climate and cheaper labor, a severe competitor. The growth of vines in this district is by no means equal to that of well-grown South Australian plants. Vintage was over at the time of my visit, and had proved practically a failure: too much rain and a virulent outbreak of fungus diseases were the causes usually given in explanation.

The extent to which the Occidental plane tree has been adopted in these districts as an avenue tree is very remarkable. Mile after mile of white dusty road is pleasantly shaded by rows of these handsome, well-grown trees; only very occasionally are the latter replaced by the erect-growing cypress. White, dusty roads, shaded by wire fences, are not unknown in South Australia, and the thought occurred to me that many of our district councils might do something towards improving the lot of the wayfarer in this direction.

It is a common sight in the Provencal vineyards to find one of the principal rules of the art completely set at nought; vine and olive trees, occasionally in rows, occasionally in irregular distribution, are to be seen struggling together on the same plot of ground. It appears needless to add that such an association ends much to the detriment of the vine. In past times, however, the olive has frequently proved the more reliable wage-earner.

I noticed whilst in this district that the railway companies do not disdain to load loose straw on their goods trucks—a practice that would hardly be admitted in Australia for hay. On the other hand, wherever I happened to come across baled straw, I noticed that the bales had been secured with five wires, and not with two or three, as is the invariable practice with us. This unnecessarily generous use of wire must serve considerably to raise expenses connected with the baling process.

I now found myself in the south of France, where, as a matter of course and of principles, what is known as *vin ordinaire* is always included in the price of a meal. It should be stated straight away that the south of France, which produces some excellent wines, owes no debt of gratitude to the hotel-keepers who advertise their wines in so gratuitous a manner. With one exception I found these *vins ordinaires* abominable: very frequently pricked, always immature, often watered, and never drinkable. It is but natural that the traveller should form his idea of the wine of the country from the samples supplied him by otherwise excellent hotels; and yet there is no doubt but that the average south of France win is a long way ahead of anything

supplied in the way of *vin ordinaire* by a good hotel. I can recollect but one instance in which I could derive any satisfaction from the hotelkeeper's gratuitous offering.

In the neighborhood of Avignon there has long existed a celebrated vineyard, known as Chateau-neuf-du-Pape: very extensive at one time, and, as its name indicates, belonging to the papal domains; it has now been split up into a number of small holdings. The wine made in these vineyards has long been reputed one of the best in the south of France. I had the opportunity of sampling some of it; to my taste, however, it appeared to be no more than the shadow of its former greatness. The old vineyards were completely destroyed by the phylloxera, but have since been wholly replanted on resistant American stock.

THE VINES OF LANGUEDOC.

From Avignon, on September 26th, I passed to Montpellier *via* Marseilles and Tarascon. The Rhone, which for some hundreds of miles flows almost exactly from north to south, in approaching the Mediterranean divides off the two ancient provinces of Languedoc and Provence, which, in the aggregate, are to-day commonly referred to as the "midi" or "southern districts of France." Agriculturally, Provence is characterised by the olive, the vine, and various primeurs; whilst its neighbor, Languedoc, is given up almost entirely to the vine. Avignon is situated on the border of the two districts, and if, as I had occasion to do, one proceeds from this town in a westerly direction it is as if one were passing through one huge continuous vineyard, and the illusion is heightened by the fact that very rarely do fences or divisions of any kind separate one owner's block from that of his neighbor. From the point of view of total area under vines and total quantities of wine produced this district must undoubtedly be reckoned the most important vine-growing district in the world; and to such an extent is the population dependent on the vine for their livelihood that any crisis affecting it speedily reduces them to the greatest distress. It is not so many years ago that a meeting of over 500,000 vinegrowers assembled at Montpellier to protest against the apathy of the Government to the general distress of the people. The hot southern blood even led to some talk of secession, although in reality the latter was never seriously entertained. In the end, however, the objects of this great popular uprising were secured: Government was compelled to realise that it was dealing with a national industry, the ruin of which it could not afford to overlook.

Some idea of the importance of the vine in Languedoc may be gathered from the consideration of a few statistical data, which I owe mainly to an interesting pamphlet published in connection with the 1910 Brussels Exhibition. Roughly speaking, the old province of Languedoc was split up after the Revolution into what are to-day the Departments of Gard, Hérault,

Aude, and Pyrénées Orientales, taking them from east to west. The area under vines in 1909 of these several Departments are shown below :—

	Total Area. Acres.		Area under Vines. Acres.		Percentage of Area under Vines to Total Area.
Gard	1,499,312	..	172,877	..	11·5
Hérault	1,549,497	..	440,755	..	28·4
Aude	1,578,310	..	294,727	..	18·7
Pyrénées Orientales ...	1,030,527	..	151,465	..	14·7
Four Languedoc Depts.	5,657,646	..	1,059,824	..	18·7
France	—	..	4,064,072	..	3·1
South Australia	—	..	22,031	..	0·009
Commonwealth	—	..	59,450	..	0·003

Thus we see that nearly one-fifth of the total area of the four Languedoc Departments were planted with vines in 1909, and that in the aggregate they form more than a quarter of the whole of the French vineyards. How small is our own interest in this direction is clearly shown in the comparative figures given below those having special reference to France.

When, on the other hand, we turn from areas to quantities of wine produced, the preponderating position of these four Departments as wine-producers is still more remarkable.

It has been calculated that over the past 10 years the yearly output of wine from the various vineyards of the world has averaged 3,362,700,000galls. Towards this enormous total France contributed 1,223,200,000galls., or about 36 per cent. Over the same period the average total output from the four Languedoc Departments has been represented by 484,660,000galls., or close on 40 per cent. of the total French contribution and 14 per cent. to 15 per cent. of the world's total output. Concurrently it should be noted that, from the point of view of area, the four Languedoc Departments do not occupy more than 26 per cent. of the total area under vines in France ; hence they form an example not only probably of the largest aggregate area under vines in the world, but they rank amongst the heaviest yields in the world. Thus in 1909—

The 172,877 acres of Gard	yielded 528galls. per acre
“ 440,755 “ Hérault	“ 669galls. “
“ 294,727 “ Aude	“ 449galls. “
“ 151,465 “ Pyrénées Orientales	“ 484galls. “

It should not be forgotten that these figures represent averages over enormous areas, and that in individual cases these averages will be very considerably exceeded. The total average yield of the four Departments over the past 10 years is given as 490galls. to the acre. The explanation of these very heavy average yields is to be found, first, in climate and soil admirably suited to heavy production of fruit ; secondly, to the exclusive cultivation of very heavy-bearing varieties ; and, thirdly, to exceedingly well-conducted tillage and general cultivation operations.

The chief red varieties now grown are Aramon and Carignane, both of which we possess, but neither of which yield as heavily here as in the south of France. On the other hand, South Australian wine made from these varieties is fuller and richer in alcohol than is the case in France. Of white varieties the principal ones in use are Terret, Piquepoule, and Clairette, which we do not possess, or at all events are only represented by a few odd plants in our vineyards.

Apart from vineyards planted in sand and those which can be flooded in winter, all this vast area has been replanted on American stock between 1876 and 1892. In this connection *Rupestis* and *Riparia* stock are at present almost exclusively made use of.

How great must be the care and attention bestowed upon general cultural operations may be gauged by the high amount of working expenses per acre disbursed each year in a country in which manual labor is not very highly remunerated. I had occasion to visit the cellars and vineyards of the *Compagnie Des Salins du Midi*. They own a vineyard about 2,000 acres in area, the general working expenses of which are represented by £32,000, that is to say about £16 an acre. This figure is inclusive of vintage and wine-making expenses, but it is exclusive of all interest on capital outlay. Working expenses calculated on this basis I found to be generally estimated at from £13 to £16 an acre, although I was assured that in many cases this average is exceeded. The expenses involved in the first three years of bringing a new vineyard into bearing, exclusive of the cost of the land, I found to be variously estimated from £48 to £64 an acre; and as the life of a grafted vineyard does not appear to average more than 25 to 30 years this initial expense represents a heavy burden to be deducted from future gross profits.

From another point of view the great importance of the vine-growing industry to the south of France may be gauged by the number of people directly or indirectly concerned in it. The 1909 statistics show French vineyard owners to be represented by 1,601,332 individuals, of which 151,499 belong to the four Languedoc Departments. To these must be added all laborers interested, coopers, teamsters, wine merchants and their staffs, &c.

An interesting table has been drawn up by M. Barbut showing the extent to which southern vineyards are split up amongst small owners. The table which is given below has reference to the Department of Aude, in which there were reckoned to be 33,047 vineyard owners. Of these—

13,888, or 42 per cent.,	owned less than $2\frac{1}{2}$ acres
14,160, or 43 per cent.	“ from $2\frac{1}{2}$ acres to $12\frac{1}{2}$ acres
2,666, or 8 per cent.	“ from $12\frac{1}{2}$ acres to 25 acres
1,320, or 4 per cent.	“ from 25 acres to 50 acres
443, or 1.4 per cent.	“ from 50 acres to 75 acres
570, or 1.7 per cent.	“ over 75 acres

This southern wine is thin, light, and very little alcoholic ; the great bulk of it is consumed before next vintage ; and, indeed, so great was the shortage at the time of my visit that wine practically warm from the fermenting vats was being disposed of to the retailers. In the circumstances one can understand that the cellar price of wine must, according to the seasons, vary within very wide margins. So great is the local demand for wine this year that I found growers refusing 1s. 8d. a gallon at the cellar door, who a few years back would have been delighted with 6d. As indicating the variations from year to year of new wine, I append below a table due to M. Jules Leenhardt-Pommier, in which are indicated year by year the prices realised by the same owner for 71 years.

Year.	Price in Pence per gall. <i>d.</i>	Year.	Price in Pence per gall. <i>d.</i>	Year.	Price in Pence per gall. <i>d.</i>	Year.	Price in Pence per gall. <i>d.</i>
1833.....	3 $\frac{3}{4}$	1851.....	3 $\frac{3}{4}$	1869.....	7	1887.....	15 $\frac{3}{4}$
1834.....	—	1852.....	3 $\frac{3}{4}$	1870.....	5 $\frac{1}{4}$	1888.....	8 $\frac{1}{4}$
1835.....	4	1853.....	8 $\frac{1}{2}$	1871.....	7 $\frac{3}{4}$	1889.....	15
1836.....	—	1854.....	11 $\frac{1}{2}$	1872.....	7 $\frac{3}{4}$	1890.....	9 $\frac{3}{4}$
1837.....	6	1855.....	11 $\frac{1}{4}$	1873.....	15	1891.....	8 $\frac{3}{4}$
1838.....	—	1856.....	19 $\frac{1}{2}$	1874.....	9	1892.....	9
1839.....	4 $\frac{1}{4}$	1857.....	11	1875.....	3	1893.....	5 $\frac{1}{2}$
1840.....	4 $\frac{1}{2}$	1858.....	4 $\frac{1}{2}$	1876.....	9	1894.....	6 $\frac{3}{4}$
1841.....	—	1859.....	8 $\frac{1}{2}$	1877.....	13 $\frac{3}{4}$	1895.....	8 $\frac{1}{4}$
1842.....	4 $\frac{1}{2}$	1860.....	11 $\frac{3}{4}$	1878.....	16 $\frac{1}{4}$	1896.....	6
1843.....	3 $\frac{1}{2}$	1861.....	6 $\frac{1}{4}$	1879.....	13 $\frac{3}{4}$	1897.....	7 $\frac{1}{2}$
1844.....	—	1862.....	5 $\frac{1}{4}$	1880.....	18 $\frac{1}{4}$	1898.....	8 $\frac{1}{4}$
1845.....	5 $\frac{3}{4}$	1863.....	5 $\frac{1}{4}$	1881.....	16	1899.....	4
1846.....	—	1864.....	5 $\frac{1}{4}$	1882.....	20 $\frac{1}{2}$	1900.....	3 $\frac{1}{2}$
1847.....	4 $\frac{1}{4}$	1865.....	3 $\frac{3}{4}$	1883.....	18 $\frac{1}{4}$	1901.....	4
1848.....	3 $\frac{1}{2}$	1866.....	8 $\frac{1}{4}$	1884.....	20 $\frac{1}{2}$	1902.....	7 $\frac{1}{4}$
1849.....	3	1867.....	7 $\frac{3}{4}$	1885.....	13 $\frac{3}{4}$	1903.....	14 $\frac{1}{4}$
1850.....	3 $\frac{1}{4}$	1868.....	6 $\frac{1}{2}$	1886.....	13 $\frac{3}{4}$		

This table does not, of course, pretend to set out what have been the average prices for good south of France wine over the 71 years concerned, since experience has shown that in the course of the same season prices may vary from simple to double, according as sales are effected at the beginning or at the end of a year. The table is interesting, however, as indicating the prices realised for new wine by the same vineyard-owner over a period of 71 years under identical methods of sale. In this connection it should be noted that in the south of France vineyard-owners never retail their own wine. Wine merchants take it off their hands a few months after manufacture ; indeed, in extreme instances, a few days after it has left the fermenting vat ; and

in any case it is the object of every vineyard-owner to clear his cellar before the advent of the new vintage. The prices given, therefore, represent cellar door prices realised for the whole of the wine made, when from three months to nine months old. When we see prices varying from 3d. to 1s. 8d. we must realise how much more of a speculation wine-growing must be in the south of France than is the case here with our relatively steady prices.

Judged by our standards, the consumption of wine in France is enormous. In 1907 it was officially estimated as 1,364,000,000 galls. That the French people are by far the heaviest wine-drinkers in the world the following statistics prove very clearly. The average yearly consumption per head of population, including women and children, is represented by—

180 quarts in France			15 quarts in Servia		
95	"	Italy	7½	"	Germany
83	"	Spain	7	"	Belgium
27	"	Roumania	1½	"	North America
20	"	Hungary	1¼	"	England
17	"	Austria			

It is contended in the south of France that wine is not so much a thirst-quenching liquid as a foodstuff which is as essential to man as bread, particularly in warm climates. In that sense southern working men practically live upon it. Vineyard hands always receive wine as part payment of their wages. A young laborer will consume about two quarts daily; an older man as much as four. A local saying describes wine as the milk of declining years. Nor can it be said that drunkenness is at all prevalent in France, and, indeed, when detected, may usually be traced to the use of stimulants other than wine. It must be recognised that the wines in general use are very much lighter than our own, and, as such, far less hea'y.

VINE DISEASES.

Whilst at Montpellier I had occasion to pay a visit to the National College of Agriculture. Unfortunately this institution was in recess, and beyond those in immediate charge of the buildings there was nobody present. I had occasion to notice that externally at all events very few changes had taken place here since I last saw the college in 1890. Later on I met M. Louis Ravaz, Professor of Viticulture at the college, on his private property at Lunelviell, and he was good enough to give me information on various points of interest relative to vine-growing in the south of France. I found him more optimistic than most of the growers as to what is likely to prove the average life of grafted vineyards, although he admitted that the task of filling up blank spaces has now entered into the regular routine of every year's work. The death or weakening of grafted plants appears attributable to various causes: poor union between stock and scion, imperfect adaptation to the soil and climate of the stock, imperfect adaptation of stock to scion, diseases, &c.

In this connection there appears to be one form of disease which has been responsible for a good many blanks in grafted vineyards. This disease goes by the local name of "court noué." Its nature and cause appear more or less obscure. The shoots of the diseased vines show abnormally short internodes and general weakness of growth. Very frequently the shoots instead of being cylindrical in outline are more or less flattened; nor are slight variegations of the leaves at all uncommon. At vintage time, when the foliage of normal plants begins to droop and assume yellowish tints, plants affected by court noué always carry leaves of a bright green color, and this abnormal color appears to persist right up to the approach of cold weather. It follows that their wood is never properly matured, and the



View from a Country House in the Neighborhood of Montpellier.

correspondingly weak plants gradually die out, or at all events prove altogether unprofitable at vintage time. I have occasionally noticed similar features on South Australian vines, particularly in the case of Grenache. M. Ravaz is inclined to attribute the disease to physiological troubles, resulting from the influence of low temperature on relatively weak plants.

Another disease which appears to be frequently responsible for the appearance of blank spaces in grafted vineyards, is what is known as "apoplexy," as distinct from "folletage." The latter disease, as is well known, is usually attributed to sudden change in weather conditions, whilst, according to M. Ravaz, "apoplexy" is caused by an internal parasitic fungus (*Polyporus*), which penetrates the internal economy of the plant through the pruning scars, and by giving rise to a sort of dry rot gradually undermines it. At first the plant may show signs of weakness on one or more of its limbs only; the latter carry poor, sickly growth, and eventually one or more limbs may

die back completely. In other cases the plants die back altogether without much previous warning. The presence of the parasite may always be detected by examining the layers immediately below the bark of any affected portion of the plant; the latter will always show an abnormal brown color. This disease I think I have also noticed occasionally in South Australia, particularly in the case of vines that had been grafted. Beyond replacing weakly and dead plants there does not appear to be much that can be done to check the disease.

“Brunissure,” or the formation of brown discolored patches on the leaves of not only vines but of other plants as well, which was formerly attributed to the action of an internal parasite, M. Ravaz believes to be the result of over-production of fruit by the plants; the leaves, when this is the case, are apt to be more or less sickly and weak, and as such liable to be burnt up by the rays of the sun.

When a new grafted vineyard is established, M. Ravaz asserts it to be the usual practice in this district to plant out ungrafted American vines, and to wedge-graft the latter in the succeeding year. Nurserymen, of course, prefer to sell ready grafted plants for the purpose. Whilst in the neighborhood I had occasion to admire several beautifully planted young vineyards in their first leaf. There was hardly a single blank to be noted, and the growth for first season growth was magnificent.

In the immediate neighborhood of Montpellier are the well-known Richter American Vine Nurseries. From the latter have been drawn many of the American vines now being planted in Victoria. These nurseries are very extensive, putting out between 2,000,000 and 3,000,000 grafted plants yearly. Their general health and appearance was, on the whole, good, although fungus diseases had proved very troublesome this season. The cuttings are bench-grafted, and when grafted average about 12½ in. in length—the scion is allowed only one eye. These grafted cuttings are planted out as closely as possible together in rows 15 in. to 16 in. apart; they are then heavily mounded up, and continue in this condition until the shoots of the scions are about 4 in. in length. The mounds are then levelled down, with the result that wherever the union between stock and scion is weak the plants die, whilst the sound unions are hardened by exposure to the weather. Many plants die out in this fashion, and from the action of other causes, with the result that at the end of a season very rarely more than 50 per cent. to 60 per cent. of sound rooted plants are secured.

Trench ploughing is the usual practice here prior to planting out a new vineyard. I had occasion to see a 10-horse team harnessed two and two on a single-furrow plough at this kind of work. They were turning over a furrow 17 in. to 18 in. deep.

It is curious to find the value of soil tillage questioned in a country in which it is usually practised with unusual thoroughness; such, nevertheless, appears

to have been the case some time back. To test the point, in three different localities the soil of a given area of vineyard has been cement concreted over, leaving only small openings through which the vine stems can penetrate, and towards which the drainage water flows. This work was done, I understand, at the rate of about 7d. a square yard. I had occasion to see some of these vines, and I must say that they appeared to me quite as healthy and strong-growing as their neighbors. I was given to understand, too, that the fruit yield had over past years proved quite satisfactory.

SOUTH AUSTRALIA AND PHYLLOXERA.

Whilst I was in contact with men competent to form an independent opinion on the subject I took the opportunity to explain the attitude that South Australia had taken up on the phylloxera question. I explained that a reserve fund had been accumulated gradually by a moderate vineyard tax, and that we absolutely prohibited the introduction of any portion of a vine into our territory. The opinion was unanimous that there existed no middle course open to us, and that it would be the most egregious folly to introduce American vines until such time as we could not do without them. I was pleased to find views which I have always very strongly held thus authoritatively confirmed.

SHEEP IN LANGUEDOC.

However much wedded the four Languedoc Departments may be to vine-growing, sheep are not unknown to them ; indeed, they are found to associate together very well. I came across some flocks of sheep imported from Algeria for topping-up purposes. The latter are grazed partly in the hilly waste lands and partly in the vineyards so soon as the vintage has been completed. I cannot say that I was much impressed with the general appearance of the sheep: they are generally long-limbed, long-necked, narrow, flat-bodied animals.

BORDEAUX AND ITS ENVIRONS.

I left Montpellier on October 4th, and gradually worked my way towards Bordeaux by Cette, Carcassonne and Toulouse. I lingered a day at Carcassonne, a city of considerable interest to the student of the middle ages, for the old "Cité" is even to this day completely begirt by that double line of fortifications and towers against which in the thirteenth century the Black Prince threw himself in vain. As one proceeds in a north-westerly direction towards Bordeaux, the agricultural aspect of the country changes completely ; the "Midi" is gradually left behind, and with it to a large extent the never-ending vineyard areas. At this time of the year it is ripening fields of maize that begin to take their place, or else temporarily vacant areas that are being prepared in anticipation of approaching cereal seeding operations. I noticed that well-groomed bullocks leisurely drawing single-furrow ploughs altogether outnumbered the visible draught horses of the districts

through which we were passing. The erect, sentinel-like poplar, too, appears to have completely replaced the spreading plane tree of the Midi.

I reached Bordeaux in the evening of the 5th. This is an important town of close on 300,000 inhabitants, and the third seaport of France. It gathers added importance from the fact that it is the official centre of the celebrated French claret districts; indeed, wine exports form one of its chief sources of revenue. In another direction I understand that the inhabitants of Bordeaux enjoy the reputation of gastronomic enthusiasts. From personal experience I can say that rarely have I met individuals who appeared to attach greater importance to the rites of the table; more perhaps than any other community may they be said to live to eat.

Through the kindness of Mr. McDonald (the British Consul) I was introduced to Mr. Barton, of Messrs. Barton & Guestier, one of the principal wine firms of the town. I was very kindly shown over their town cellars, which consist for the most part of a veritable labyrinth of winding drives, running under buildings and neighboring streets. Here I saw stacked away over 2,000,000 bottles of the choicest clarets and countless rows of casks. In accordance with local usage, which would prove fatal if adopted in Australia, these casks were lying with bung-hole on one side, and left on ullage for six months at a time. Bottling operations were in full swing at the time of my visit, and I had occasion to notice how little mechanical devices so common elsewhere had found favor in this ultra-conservative district. Apparently bottling or capsuling machines were things not to be thought of; they might have the effect of reducing the quality of the wine, which from time immemorial has been successfully bottled without them.

On the following day Mr. Barton was good enough to motor us over country districts adjacent to the town. I was thus able to see Chateau Margaux, Chateau Laffitte, and Chateau Barton-Léoville. I was highly amused at the somewhat hostile reception accorded to us at Chateau Margaux. In my 12 months' wandering over different parts of the world it is the only instance of the kind that I met with. Indeed, hitherto my experiences in this direction had been monotonously tame. It appeared to me that all those whom it had been my good fortune to meet felt that they could not do enough for a somewhat inquisitive stranger. Chateau Margaux, however, supplied the excitement of a novel experience. Its management is in the hands of a callow youth, so primed up with occult knowledge of his craft that he appeared to think that a mere glimpse of his speaking features might betray some of the secrets he so jealously guarded from the eyes of discerning visitors. A party of foreigners to look over Chateau Margaux! The invisible potentate sent out one of his understrappers to take charge of us, with instructions apparently to pilot us dexterously away from whatever might prove of interest. I expressed a natural desire to look over the wine cellars. Our unfortunate guide, who was politeness personified, and appeared

loath to disappoint us, seemed for the time being to have forgotten the exact spot where the cellars happened to be. Twenty to thirty minutes were thus wasted in fruitless search, when, to our inexpressible joy, the irate magnate appeared on the scene. He immediately proceeded to explain to Mr. Barton in most voluble French—which language, unbeknown to him, I happened to understand—what he thought of Englishmen, Australians, and Americans, who flocked down from all the corners of the earth with the sole object apparently of picking his brains. Mr. Barton, with the tact of a diplomatist, proceeded to stroke his ruffled feathers, and explained that not only did I not own a single vine, let alone a wine cellar, but that I was merely attracted here by idle curiosity, backed up by admiration for the magnificent wines made under his immediate supervision. Eventually diplomacy carried the day, and we were finally allowed to look into the cellars, where preparations were being made for the vintage. In the circumstances, I felt compelled to sink my identity and confine my admiration to the immaculate cleanliness of the premises.

The Chateau Margaux vineyard is 200 acres in area, and kept in perfect order; not a weed to be seen, not a shoot out of place. Here, in accordance with the usual practice of the district, the vineyard is ploughed up four times in the course of a year.

Mr. Barton informed me that all the Chateau Margaux wine had been sold in advance for a period of five years at the rate of £16 the Bordeaux hogshead (about 50galls.)—that is to say at the rate of 6s. 3d. a gallon. This apparently is by no means an exceptional price for the wine of these cellars, as much as £40 a hogshead, or about 16s. a gallon, having at times been paid for it.

At Chateau Lafitte, which is owned by the Paris Rothschilds, our reception was very different. The manager showed us very courteously over the cellars, and willingly supplied all information in his power. Vintage operations had not yet been put in hand. I was shown the large, shallow cement tanks in which, in accordance with local usage, the fruit is still trod out under foot, and from which husks and juice are transferred to large, open wood fermenting vats, of a capacity between 6,000galls. and 7,000galls. General fermentation very rarely outlasts a week, and the new wine is rapidly transferred to new hogsheads of the best Austrian oak. The area of the Chateau Lafitte vineyard is the same as that of Chateau Margaux, viz., 200 acres.

Later on we visited Chateau Barton-Léoville, the patrimony of our host. Here we were shown the ancient fiddle, to the melodious strains of which, in accordance with time-honored custom, the harvested fruit is rhythmically trod under foot. The buildings are spacious and well kept, as indeed appears to be the case throughout the district. I had occasion to regret that my visit should have fallen upon a more or less idle day. Vintage was only just about to begin. We were introduced to the vast kitchen, in which was in

course of preparation the evening meal of the working staff. Although hoary with age, this room was spotlessly clean, a shining example of what can be done when a proper pride is taken in the daily task. We wandered over the grounds and vineyards; the latter beautifully kept, but showing, unfortunately, little more than what we should call a good second crop. The whole district appeared enveloped in gloom, for the vintage appeared likely to prove a more or less complete failure. Mr. Barton did not think that more than a fifth of a normal crop would be harvested for the whole district. Apparently, in this neighborhood, the caterpillar of a moth known to the French as *cochylys* is quite as much to blame as the abnormal prevalence and virulence of cryptogamic diseases, the natural consequence of a very wet season. This caterpillar—a close relative of our old friend the codlin moth—attacks the vine flowers in the early spring, just as they are about to open; and later on in summer there appears a second brood, which bores its way into the berries, enveloping them the while in a light, silken web. The damage done this year by the *cochylys* has been very considerable. Let us avoid importing this undesirable emigrant.

As one traverses the Bordeaux vineyards one cannot help being struck with the curious results of the extreme parcelling of property in France. Here and there, wedged in amidst the vines of larger owners, without fence or division of any kind, one comes across a dozen rows or so of vines, said to be the property of some small peasant owner. An ancient custom has decreed that whilst wine made from the larger areas may be worth £16 a hogshead, the wine from these few intruding rows can never rise above ordinary Médoc. Careful manipulation has doubtless much to do with the ultimate quality of any wine; it must be admitted, however, that imagination has its full share in the commercial classification of Bordeaux wines, established hundreds of years ago, when it may have had its *raison d'être*, but maintained to-day I believe very largely in the vested interests of the most conservative of trades.

From time to time one hears it stated that the Bordelais vinegrowers had manfully stood out against the introduction of American vines, and set themselves to master the phylloxera by other means. I can readily understand the heartiness of their initial opposition to any practice unknown to their grandfathers, for they are too painfully aware that let them vary but a hair's breadth from general ancestral practice, and forthwith, in sympathy, down come the market quotations of their wines. The phylloxera, however, an American intruder without time-honored pedigree, was not to be denied. Ancestral cult and ancestral scruples were soon swallowed up in black ruin, and the conservative Bordelais found themselves compelled to borrow the methods of their more enlightened neighbors; and to-day, I was credibly informed, the great bulk of Bordeaux vines are grafted on resistant American stock. Nor does one hear much talk of any depreciation in quality of the new wines, as who should, before the logic of accomplished facts?

The district through which we were driven had all the appearance of poor country from the general agricultural point of view ; the soil is light in character, and more or less stony on the surface. It is certainly fortunate that soil of little value for other purposes should be able to yield wine the general quality of which has never been approached anywhere else in the world. Here and there one even runs into the sandy wastes of the Landes, once a standing menace to neighboring towns and villages, but now more or less completely reclaimed and fixed by vast plantations of pines (*Pinus maritima*), which are periodically tapped for their resin.

THE LANDES AND THE PYRENEES.

On October 9th I set out for Bayonne, in the direction of the Spanish frontier : I thus had the opportunity to traverse the Landes, that flat, dreary waste of country so largely planted over with Maritime pines during the course of the last century. I have collected some interesting figures which will serve to illustrate the progress of afforestation in this district within recent times. The total area of the Department of the Landes is represented by 2,330,325 acres. Of this area there were in 1842, under forest trees, 583,110 acres, *i.e.*, over 25 per cent. of the total area ; in 1860 the area under forest trees had risen to 959,900 acres, *i.e.*, over 41 per cent. of the total area ; and in 1882 to 1,299,380 acres, *i.e.*, close on 56 per cent. of the total area. I have not had occasion to see more recent statistics ; but I have no reason to believe that the afforested area has undergone any reduction since 1882. The bulk of the forest lands, as is indeed the case throughout France, are State owned ; portion of them, however, are the property of local *communes* ; and portion again that of private individuals. Although the great bulk of these forests consist of Maritime pines, exploited both for their timber and their resin, there are also to be found in the Landes forests various types of oaks, poplars, chestnut trees, robinias, &c. The value of these forest lands is said to have varied in recent times within the following limits :—

	£ s. d.			£ s. d.		
In 1852—From	9	2	9	to 14	10	5 per acre.
“ 1862 “	6	4	6	“ 40	18	3 “
“ 1882 “	6	10	7	“ 33	15	2 “

In this connection, I take it that, from our point of view, the principal interest attaches to the reclamation and afforestation of the sandy wastes and dunes bordering the Atlantic Ocean, which, for centuries hampered settlement on the south-west coast of France. These moving dunes are said to have choked up watercourses and engulfed forests, and even towns and villages. These waste lands which adjoin, and indeed form part of the Landes, are said to cover an area exceeding 220,000 acres. Their reclamation and afforestation was first taken in hand in 1781 by the engineer Brémontier. The work has been continued and completed during the course of the

last century on the lines originally laid down by him. To-day, reclamation and afforestation have, more or less, completely shorn these moving sands of their power for evil; nevertheless, they continue to call for constant watchfulness, lest the toil of a long century should, after all, go for nothing; and the cost of the upkeep of the reclamation works is said to exceed £12,000 a year.

With our present superabundance of territory we do not always realise how dangerous, in time to come, may prove these sandhills which we ruthlessly strip of their covering of native shrubs and trees, that our flocks and herds may the more readily graze thereon. But, even within our days, the late Albert Molineux never wearied of pointing to the damage that was already being done by the moving dunes of the Coorong; and from time to time we hear of the spasmodic efforts of private individuals to stem the advancing sand. But not until the whole power of the State is brought to bear on the matter, and a scheme of protection be worked out on rational lines, as was the case in France some hundred years ago, will anything like success be obtained; and the longer the time we take to realise that such must be the case the costlier and more difficult is the task likely to prove.

As one approaches Bayonne and the Pyrenees the general character of the country changes for the better. One gets glimpses of opulent pasture lands confined by luxuriantly overgrown hedges, curiously reminiscent of Ireland.

I spent five days in the neighborhood of Bayonne and Biarritz, but find that the only note of general interest made thereon has reference to the sumptuous trappings of the bullocks hauling the local carts. The pride of each driver appears to have become concentrated upon his yoke, which is not only useful, but ornamental into the bargain; it is generally bedecked with the whitest of sheepskins.

One day we spent in motoring into the Pyrenees and over the Spanish frontier; from sea-level we gradually rose to 3,500ft. at Roncevaux. The scenery was fine and the mountains well wooded; but, unfortunately, more or less continuous rain took some of the gilt off the outing. We passed through Saint-Jean-Pied-du-Port, now a picturesque village, once the capital city of Basse-Navarre. We crossed the Bidassoa and stood on the bridge separating France from Spain, and finally ascended to Roncevaux, where, according to legend, Charlemagne and his Paladins were defeated by the Saracens. In appearance, at all events, there is little to choose between the Basque of the French slopes of the Pyrenees and his cousin of the Spanish slopes. He is clean-shaven, wears a "béret"—a sort of Tam o'Shanter cap—and on festive or ceremonious occasions is addicted to sombre garments, knee-breeches, and flat-brimmed hats. I was not much impressed with the cows occasionally to be met with grazing on the hill slopes; they have coarse, stag-like heads, and very defective milk vessels. Oxen, mules, and asses appear to be the usual beasts of burden; horses are but rarely met with.

Fine old oak trees are sorely maltreated in the district ; they appear to be systematically pollarded to a height of 9ft. to 10ft., and their gnarled stems stand crowned with a wild, weak growth ; and beneath them are stacked up the lopped branches, apparently the customary firewood of the country. At the time, here and there, farmyard manure was being distributed over the fields in small and distant heaps, which argued of scarcity, for the average dressing did not appear to me to exceed 3 tons to 4 tons to the acre. I noticed a few, more or less, ill-grown maize crops ; and, on the whole, apart from their glorious woods, and from the agricultural point of view, these mountainous regions have very far from a prosperous appearance.

I now found myself beset with difficulties. The next stage in my wanderings should have taken me from Bayonne to Spain. At the time, however, Portugal was in the throes of political revolution ; and the daily press never wearied of impressing on the public that it would be Spain's turn next and that right speedily. On the other hand, the great French general railway strike was threatening country towns such as Bayonne with isolation, and acts of " sabotage " were of daily occurrence. Had I been alone there was nothing very alarming in this state of affairs ; I had, however, to think of others in my charge. Finally, I decided that it was, on the whole, preferable to risk the chances of a Spanish revolution rather than remain cooped up indefinitely in Bayonne ; hence, on the 14th of October, we were fortunate enough to secure seats in a special train making for the Spanish frontier. The regular train between Paris and Irun had been delayed by the strike, and, fortunately, as yet, the Bayonne railway men were only considering the desirability of joining in the fray. By way of precaution, however, the railway line was guarded throughout its length by an extended line of armed patrols.

SPAIN.

On the frontier the attentions of Customs officers were unremitting. Contrary to usual custom, they overhauled and minutely examined every article in our possession. It was " bombs " and other anarchist gear that they were after, apparently. We were incurring the penalty of travelling in troublous times, and possibly in bad company. Another surprise awaited us on the threshold of Spain. I had taken the precaution to take out beforehand " combined circular railway tickets," covering a specified itinerary over the Spanish railways. As we proceeded to board the Spanish train we were very politely informed that it was a special train, and that if we wished to travel by it we must take out a special supplementary ticket. There was no time to argue the question, and with all the good grace that I could summon

I submitted to what I was inclined to look upon as an act of extortion. Later on, however, it was brought home to me that in Spain all trains are special trains, with the exception of a few, which in equipment and pace are little better than ordinary goods trains. The distance between Madrid and Seville, for instance, is 355 miles by rail; this distance is covered by the ordinary train in $24\frac{3}{4}$ hours, that is to say, at the rate of a little over 14 miles an hour. In the circumstances one cheerfully pays the supplement and travels by the special. One should beware of imagining, however, that railway expenditure ends with the purchase of circular tickets. There is this much to say in favor of slow railway travelling: I never once found Spanish trains to be behind scheduled time; indeed, they frequently anticipated it. In Italy, on the other hand, there appears to be no connection whatsoever between scheduled time and the time actually observed by the railways.

Our destination was now Madrid, by rail 392 miles from the frontier, a distance covered by the special in 15 hours and by the ordinary in 26 hours. At first the railway line winds in and out of most picturesque mountain scenery. I noticed on favorable slopes frequent maize fields, much greener and less forward than those of south-western France. Evidently here the altitude is sufficiently great to neutralise the usual influence of latitude. Here and there a well-tilled field of sugar-beet or mangolds lends variety to the landscape. Robinias appear to have been planted very freely along the railway line and in its immediate neighborhood. South of Alsasua, however, erect poplars tend to supersede them. We were now traversing a rather flat, uninteresting tract of country of no very promising agricultural appearance. I noticed, occasionally, flocks of gaunt, hungry-looking sheep—not Merinos—flat-ribbed, long-legged, and wholly unprepossessing. From Santa Olalla, southwards, autumn ploughing appeared to be in full swing—the plough, the old Roman wooden plough; the team, a pair of patient oxen; and the furrow, a mere scratch on the face of mother earth. They were breaking up last year's stubbles, with the intention, no doubt, of sowing them again to cereals on the first appearance of rain. These stubbles, as far as I was able to see, were very far from the remains of heavy, well-grown crops. Occasionally small heaps of farmyard manure were to be seen scattered over the fields, but in even smaller quantities than those I had already noted in the Basque country. As we approached Burgos the character, both of the soil and general agricultural operations, appeared to improve. Thereafter falling darkness gradually screened from our view what of interest might attach to the country-side; and eventually we steamed into Madrid at 11-30 p.m.

I made Madrid my headquarters until the evening of the 18th. The town is without any particular *cachet* of its own; it is no more than the replica of many a town of its size scattered over southern Europe. The Prado Museum is justly celebrated for its unique collection of the works of

Velasquez the great, and of Murillo the entranced; to my taste, however, it is somewhat overburdened with fleshy, Dutch paintings.

I took advantage of our stay in Madrid to visit El Escorial, the vast monastery and mausoleum, erected by Philip II., in fulfilment, it is said, of a vow made in time of battle, and ever since the burial place of Spanish monarchs and their consorts. Externally, these massive granite buildings, that appear to spring out from granite flanks of the Guadarramas, have a forbidding, prison-like appearance; internally, their general sombreness is sometimes relieved by over-ornamentation. Of the various portions of this stupendous edifice, the Pantheon—ever since the time of Philip II. the last resting place of Spanish monarchs—must, in its simplicity of conception and design, always leave the most abiding impression on the mind of the interested visitor.

El Escorial is 31 miles by rail from Madrid. This, therefore, was my first acquaintance with the country in the immediate neighborhood of the capital.



Andalusian Mules Carting "Cocky Chaff."

I had often heard of the bleak, inhospitable character of this central plateau of Spain. At this time of the year one realises that it has not been maligned; and yet there appears to be no lack of depth in its yellowish grey soil, which may be possessed of latent fertility, capable of telling quite another tale at a more favorable time of the year. The most striking feature of the landscape is the total absence of trees in any shape or form. It has been stated—with what amount of truth I do not know—that thousands of peasants of Castile and Leon live and die without ever having set eye on a single tree. Complete extirpation of all trees appears to have been the inhabitants' drastic remedy against grain-eating birds. One is tempted to the conclusion that the remedy has out-Heroded Herod. For what would not wisely distributed shelter-belts do towards tempering the climate of this bleak plateau, some 2,500ft. above sea-level? This dreary waste of country accompanies one

from Madrid to the slopes of the Guadarrama, and then gives way only to a veritable wilderness of huge, weather-worn granite boulders.

ANDALUSIA AND GRANADA.

On the evening of the 18th of October we left Madrid for Southern Spain, where lie the fairest and in many ways the most interesting provinces of the Peninsula. For it is here that the Moors lingered longest before their final expulsion in 1609, and it is here that are to be found in greatest profusion the architectural relics of their domination and those progressive agricultural methods imposed by them on a semi-barbarous people. For was it not the Moors who taught the Spaniards that wherever running water is available the desert may be made to blossom like the rose? And the five centuries that now separate us from the period of their ignominious expulsion, and all the terrors of the holy inquisition have not sufficed to efface the imprint of their footsteps. My earlier days had made me tolerably familiar with the Moors and Arabs of Northern Africa, some of whom, indeed, were the direct descendants of these unfortunate Andalusian Moors. For to this day is to be found in the Moorish quarter of Tunis a street known as the "Street of the Andalusians." It was here that, centuries ago, these flying Andalusians found a haven of refuge amidst their kindred, carrying with them the keys of their abandoned Spanish dwellings, keys which to this day their descendants cherish as sacred heirlooms in the vain hope that the day may yet dawn when they will serve to drive back the time-rusted bolts. And now, at Seville, had I not known that the Moors had held sway here centuries ago, the very circumstances that surrounded me would have revealed it. The Christian Andalusians of the present day, their general appearance, their habits of life, their street cries, even to their personal idiosyncrasies, were all strangely familiar to me, and strongly reminiscent of the impressions and sensations of other days. The Arab's idea of music is certainly not our own, and although from the minaret top he will demonstrate freely enough that he has some notions of voice production, he does not deem it art to avail himself of it in the droning of his melancholy chants. The Arab in singing barely opens his mouth, and hums out in a minor key his nasal melodies from perfectly expressionless features. This is his special idiosyncrasy, peculiar to him, I take it, in all the world. And yet here in Seville was the same trick of execution, the same melodies, and, for all I know, the same words. The spirit of the vanished Moor still broods over the land.

BULLFIGHTS AND LOAFERS.

Whilst I was in Andalusia I was informed that bull-fighting was very largely responsible in Southern Spain for the existence of a vast number of hopelessly incorrigible loafers, who were fast becoming a menace to the community. From their earliest days country youths aspire after the honors and

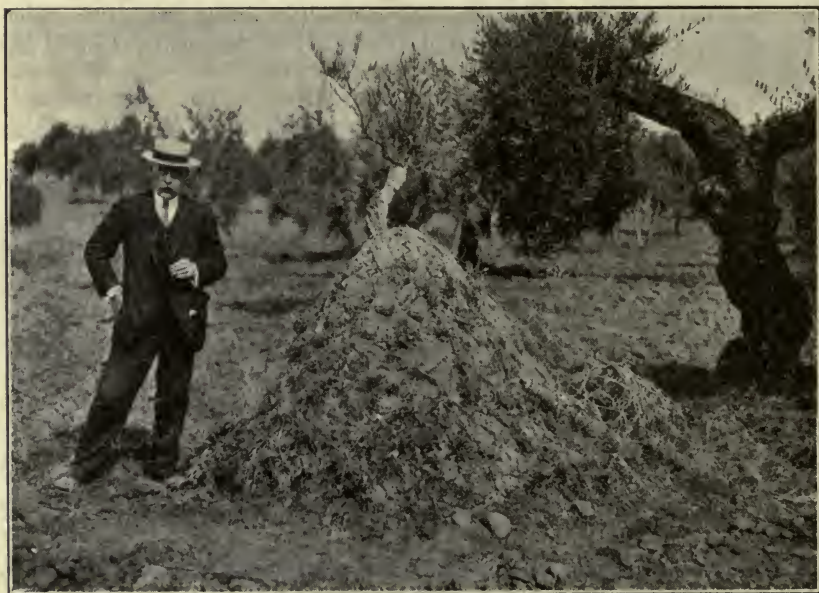
emoluments of the successful bullfighter. In their eyes he is the national hero, *par excellence*, to be admired and applauded in the present and, if possible, to be succeeded in a rosy future. To this day children may be seen playing at bullfights, quite as much as in the days of Velazquez, of which he has left us on canvas a realistic record; hence, on the approach of manhood, there are hundreds who endeavor to give effect to the dreams of their childhood, and the threshold of the arena is thronged with would-be *espadas*. Unfortunately there are but a select few who have all the requisite natural aptitude for the perilous game. The unsuccessful are slow to recognise their hopeless unfitness, and the time comes when they find that whilst they have failed in one vocation they have also lost aptitude and desire to earn their living in any other calling. And in this manner the ranks of the dangerous and unemployable are constantly being recruited. This, I was informed, was one of the social sores of every Andalusian town of any importance.

THE ANDALUSIAN OLIVE GROVES.

What the vine is to Southern France the olive tree is to Southern Spain. One traverses here mile upon mile of almost continuous olive groves, and from the railway carriage at times nothing beyond their grey-green livery comes within the range of the traveller's vision. From the outset there arose a point in connection with these Andalusian olive groves which puzzled me much, and it was only after patient cross-examination of many a grower that I succeeded in solving the riddle. Every now and again one meets in these groves what appears to be a young tree protected all round by a conical mound of earth about 5ft. to 6ft. in height. I could not understand why growers should go to the trouble and expense of shovelling up so great a quantity of earth for no particular purpose. City folk appeared to be under the impression that it was a precaution adopted to secure the union of the graft. Such an explanation appeared to me ridiculous on the face of it, as there exist hundreds of cheaper and simpler methods for securing the same result. When I started interviewing growers I was further puzzled by an almost unanimous opinion that olive trees yielded payable crops between their third and fifth year; here, then, was evidence that in Spain at least olive trees are not planted out by the benevolently inclined for the special benefit of future generations. Ultimately it was by piecing together these two puzzles that I was able to get at the wherefore of this strange practice.

This apparently is what takes place. A new olive tree is always started from the shoot, or truncheon, of a wild olive tree, of which apparently many natural groves exist. The term "truncheon," however, is not used here in the sense that we usually attach to it, viz., a shoot 12in. to 18in. long and about 1in. to 1½in. in diameter. The Spanish truncheon would be more correctly described as a strong limb or branch of a tree. It is 9ft. to 10ft.

long, and the thicker the better. I was told by a very intelligent old olive-grower that the diameter of the truncheon should not be less than 4in. to 5in. at the small end. This huge truncheon, or limb, is placed erect in a hole 3ft. deep dug for the purpose; hence, whilst 3ft. of the limb are below ground, 5ft. to 6ft. are above it in the shape of a stem for the future tree. One can realise readily enough that a young tree of this kind, set up at so much expense, would stand in need of special protection. Its leverage above ground is very considerable, and if in the early stages it be jarred or moved in any way, whilst the young roots are in process of formation, there will be a tendency to tear the latter away from the stock and otherwise hinder their normal development. The huge mound of earth which is now heaped up against



One-Year-Old Olive Tree Mounded up and Grafted.

the stem will serve to protect the tree against accidents of this kind. This, however, is very far from being the main object of the mound. This long, denuded stem, 5ft. to 6ft. in height, offers an enormous evaporating surface in the summer months; hence the mound of earth fills a double purpose—it affords support to the young tree, enabling it to make suitable root growth at its ease on the one hand, and on the other it protects the plant from the desiccating influence of the sun's rays and of bleak winds. During the summer months these young olive trees are sometimes watered by the simple but somewhat primitive device of boring oblique holes in the mounds of earth and pouring water into them.

Planting and mounding up of the young trees takes place in the early winter months. No shoots are allowed to grow from the plant except a few from the summit, which are grafted in the summer. With the return of winter weather the mounds are taken down, and the stem of the young tree, which by this time will have been firmly rooted, is exposed to the air.

On the whole this is certainly a very costly system of planting. What, then, are its special advantages, if any? They appear to me, if I was correctly informed, to lie in the fact that a mounded-up young tree will yield payable crops of fruit from five to six years sooner than is the case under the usual methods of treatment. This fact alone amply justifies, in my opinion, the



Two-Year-Old Olive Tree.

heavy initial outlay, provided always that it is not accompanied by other objections that did not come under my notice. It appears to me possible that trees raised in this fashion may prove shorter lived than is usually the case. In any case I propose testing this method of olive-planting at Roseworthy in the coming season. Even were the complete success of the system definitely proved in South Australia, we should always find ourselves faced with the difficulty of securing limbs of the requisite dimensions. I should add here, too, that all growers appeared very emphatic as to the absolute necessity of making use of wild olive branches only. It is possible, however,

that this view may have originated in a natural reluctance to lop off large branches from grafted and fruit-bearing trees.

In Granada, the planting practice in vogue appeared to me essentially different. In this province one meets frequently with what appear to be trees with four main branches, of approximately similar dimensions, starting immediately from the soil, like the trunks of four separate trees. And, effectively, this is what they are. Instead of establishing from the outset a single tree, in this district they appear to plant out four stout truncheons, about 2in. to 2½in. in diameter, on the angles of a square, with a side of about 20in. to 24in. All four truncheons are allowed to strike root and form, eventually, four separate trees, starting approximately from the same spot.

It would appear that in Spain, as I already noted to be the case in Greece, olive trees are always grafted at a considerable distance above ground, frequently 5ft. to 6ft. The graft is protected by a coat of moist clay, maintained in position by a strip of white calico.

According to the somewhat conflicting statements of growers I had occasion to interview, the distances apart at which trees are planted vary from 8 paces to 14 paces, which I take to be 24ft. to 42ft. This represents from 25 to 76 trees to the acre. It appears to be the general practice to adopt rather close planting on the richer types of soil. On the whole, the Spanish olive trees did not impress me much with their size. It appears to be a very common practice to grow cereal crops between the rows of olive trees; barley generally being preferred for the purpose. The latter is sown in autumn at the rate of 55lbs. to the acre, and they generally count on a yield of about 15 to 20 times the amount of seed sown, that is to say, about 16bush. to 22bush. to the acre. Normally, olive groves not under cereals are supposed to be ploughed three times in the course of a year, namely, in January, in March, and in May. In this connection it may be stated that whilst I certainly saw in Andalusia some very well-tilled olive groves, examples were not wanting of almost complete neglect and abandonment. It should be added that the 1910 crop was an almost complete failure, which may in some measure account for the apathy of some of the growers.

Pruning practice I found to vary much on the same lines as is the case in the olive-growing districts of the south of France. All growers I questioned were absolutely unanimous on the absolute necessity of pruning the trees, if one wished to secure good crops. Some, however, preferred pruning the trees rather heavily in alternate years, whilst others were in favor of regular yearly pruning. As far as I was able to see, growers, in their pruning operations, appeared to aim at maintaining the trees well within control; nowhere did I see very large overgrown trees.

The pickling olives—invariably of the Queen olive variety—are always individually hand-picked; whilst olives to be used in the manufacture of

olive oil are beaten off the trees with light wands and received on a sheet stretched out below.

In this district I was informed that 10cwts. of olives to the acre would be looked upon as a good crop. How this yield compares with statistical data for the whole country is shown below. It is true that I was cautioned against attaching too much importance to Spanish official statistics. In my experience, however, complaints of this sort are common to all countries. If statistics do not confirm our own preconceived ideas, they are forthwith condemned as faulty and bad ; if the reverse is the case, they are proportionately extolled. I submit, therefore, the data below, subject to the caution I received, which may or may not be well founded.

The total area under olive trees in Spain was given as 3,383,000 acres in 1907, and 3,469,300 acres in 1908. It would appear, however, that the difference of 86,300 acres between the two totals does not so much indicate



Autumn Work in Andalusian Olive Grove.

an actual increase in area under olive trees, as a more accurate determination of areas in 1908, than was the case in 1907.

The total Spanish olive crop is said to have been represented in 1907 by 1,579,641 tons. This works out at an average yield per acre of $9\frac{1}{2}$ cwts. of olives, that is to say, not far from my informant's estimate as to what constituted a good crop in Andalusia. It follows, therefore, that 1907 must have been a good olive year in Spain. Of the total 1907 crop, 1,507,059 tons were employed in the manufacture of oil ; whilst the balance, 72,582 tons, were presumably used for pickling purposes. Olives used in the manufacture of oil returned a total of 73,762,259galls. of oil, that is to say, an average return of 2.44galls. of oil for every hundredweight of olives.

Olive returns were by no means as satisfactory in 1908. The total crop is said to have attained to 812,936 tons of olives, or slightly over $4\frac{1}{2}$ cwts. to the acre. Of this total, 796,207 tons were absorbed in oil manufacture,

and the balance, 16,729 tons, presumably in the pickling business. The total amount of oil produced reached 36,337,893galls., *i.e.*, an average return of 2.28galls. of oil for every hundredweight of olives.

These figures serve to show how great a factor in the national wealth of Spain is the olive oil industry. From inquiries I made on the subject it would appear that within recent times the value of a gallon of oil on the Spanish markets has varied between 3s. 3d. and 4s. 7d. If we adopt 4s. a gallon as a fair average figure, the total olive oil crop would have been worth to the nation, in 1907, about £14,752,452, and in 1908 about £7,267,579.

I have already stated that I was informed that 10cwts. of olives to the acre would be looked upon as a good crop in Andalusia. This would represent about 24galls. of oil to the acre, or a gross return to the grower of about £4 16s. an acre, which, in a country in which living is relatively cheap, would, I presume, be looked upon as a very fair return.

The great bulk of the oil produced appears to find a local outlet. Indeed, Spaniards may be said to live upon it. I notice that in 1908 the exports of olive oil are officially valued at £776,742 and in 1909 at £970,705; whilst pickled olives were responsible for £225,704 in 1908 and for £274,259 in 1909.

Thus, in 1909, out of total exports to the value of £34,299,185, the olive industry of Spain was responsible for £1,244,964.

Wages in this district appear to be very low. An ordinary agricultural laborer receives two pesetas a day (about 1s. 6d.); and, in addition, a few of the necessities of life, represented by oil, vinegar, salt, pepper, garlic, and tomatoes. Olive-pickers, on the other hand, receive only from 5d. to 7½d. a day, together with a little firewood to remind them that they are alive.

SEVILLE AND ITS ORANGES.

We tarried at Seville from the 19th to the 23rd of October. Had I the leisure, there were much to be written, and to good purpose, of this semi-Moorish city, resting on the banks of the broad Guadalquivir. Here we may see the Alcazar, that ancient palace of the Moorish kings, and its beautiful gardens; the wonderful cathedral, awe-inspiring in its size, and enriched by many an art treasure; the Museo Provincial, with its priceless collection of Murillos; the House of Pilate; the beautiful palm-sheltered squares; the quaint Moorish houses, &c. All matters, however, having not the remotest connection with things agricultural. I turn aside from them, therefore, with regret.

The British Consul (Mr. A. L. Keyser), who received me very courteously, supplied me with an introduction to a Scotch resident of Seville, Mr. McDougall by name, who was good enough to give me some information on agricultural matters. The staple produce of the countryside appears to be represented by oil, wine, and oranges. According to Mr. McDougall, in the neighborhood of Seville, bitter oranges are grown almost to the exclusion of any other

varieties. For the last 10 or 12 years, however, these trees have been in a very parlous condition. Indeed, what little I saw of them did not serve to impress me much with their healthiness. It would appear that the leaves, and even the fruit, are regularly attacked by some form of rust, which causes them to wither away and fall to the ground, much to the detriment of the tree. Apparently no remedy for the disease has yet been discovered.

It would appear that Spanish orange-growers generally are beginning to feel the stress of foreign competition in the markets of the world. At their special request the Government has started on an inquiry into the actual position of affairs. It seems that within recent years the Spanish orange output has outrun what the markets of the world are prepared to take at remunerative prices from the Spanish grower's point of view. The following figures will serve to show to what extent, within recent years, exports have risen and average prices fallen.

Exports of Spanish Oranges.

Year.	Total Oranges Exported. Tons.	Total Value. £	Value per Ton. £ s. d.
1896	215,303	1,514,815	7 0 9
1900	260,226	1,444,444	5 11 0
1905	409,631	1,740,740	4 5 0
1907	469,297	2,607,407	5 11 0

Great Britain absorbs a good bit over half the oranges and lemons exported from Spain. Recent figures concerning these two lines are shown below.

Imports into Great Britain of Spanish Oranges and Lemons.

	Tons.
1906	235,320
1907	270,097
1908	256,689

It would appear that the total area under oranges and other citrus fruits in Spain is in excess of 100,000 acres.

VINEGROWING IN SPAIN.

In Mr. McDougall's opinion vinegrowing in Spain is a very poor business with the phylloxera to reckon with. He estimates the cost of establishing a new vineyard on American stock at £16 an acre; and with the low prices at present obtaining in Spain he is inclined to look upon this initial outlay as prohibitive. I was informed that the average price of common wine varied between 3½d. and 7d. a gallon. Table grapes are sold at the rate of 7d. to 9d. the arroba (about 25lbs.), which works out at £2 10s. to £3 3s. 3d. a ton.

It would appear that throughout Spain the vinegrowing industry has fallen upon critical times, and the representative bodies of both growers

and wine merchants are petitioning Government to take steps towards helping the industry out of its difficulties. The following recent statistical data will serve to show the national importance of vinegrowing.

Year.	Acres under Vines.	Total Grapes Harvested.	Tons per Acre.	Grapes for Winemaking.	Wine Made.	Wine to One Ton of Grapes.
	Acres.	Tons.	Tons.	Tons.	Gallons.	Gallons.
1905	3,653,260	3,074,340	0.84	2,748,850	389,483,116	142
1906	3,496,925	2,436,817	0.70	2,158,410	298,644,190	138
1907	3,418,638	3,114,931	0.91	2,846,468	404,455,414	142
1908	3,275,778	3,146,058	0.96	2,889,654	408,247,774	141

In conjunction with the above figures it should be noted that in 1908 Spain made 3,528,150galls. of brandies of various types and 8,827,260galls. of strong spirit from wines. The above figures will serve to show how important are the interests involved in the crisis through which the industry is said to be passing. It will be noted how low are the yields per acre; in no single year was a yield of a ton of grapes to the acre attained.

On the whole it is easy enough to account for the present crisis. It is the old story of over-production under the temporary stimulus of abnormal prices, with corresponding depression on the gradual disappearance of previously available markets. When in the early eighties the old French vineyards were practically swept away by the phylloxera, the wine-drinking French population had to look elsewhere for wine that was almost as essential to them as bread. In this direction their immediate neighbors, the Italians and Spaniards, benefited temporarily by contributing to the pressing necessities of the French. This abnormal state of affairs led to extensive vine-planting in Spain, in the same way as I have shown elsewhere in this report it led to extensive currant-planting in Greece, and for a few years big business was done by Spain in this line. Indeed, Spanish wines were particularly sought after by French winebuyers, mainly, it is said, because their high alcoholic strength, their great body and color, readily allowed of their being increased in volume, once over the border, by the process that the French sometimes irreverently term "baptising." In the course of time, however, the French vineyards slowly rose again from their ashes, and French growers naturally resented this somewhat unfair competition of the strong, full-bodied Spanish wines which had found so much favor in the eyes of the merchants; hence a comprehensible French viticultural crisis, followed by new Customs arrangements, which had the effect of practically shutting the door to the common Spanish wines; and the Spanish vine-growing industry which went up like a rocket came down like a stick. There are a variety of remedies that are being advocated to enable growers to get out of the difficult situation in which they find themselves. Amongst these may be instanced the free distillation of wines, the enforcing of the law which

prohibits the fortifying of wines with any other spirit than wine spirit, rigid enforcement of the law against adulteration, the opening up of new markets (particularly in Spanish America and Cuba), and, finally, approaching Great Britain with a view to persuading us to forbid the sale of wine made in England from raisins as Spanish wines. The latter proposal emanates from the Reus syndicate of wine exporters, who aver in all seriousness that artificial wines are “manufactured on a gigantic scale in the Argentine Republic, in the north of Germany, *but above all in England!*” Great Britain is at the present time Spain’s best customer; Spain, on the other hand, does not import from Great Britain more than 18 per cent. of her total imports. If we are to offer a refuge to Spanish wines, it would seem reasonable to ask her to lower her somewhat prohibitive tariff in other directions.

According to the President of the British Chamber of Commerce of Barcelona, Great Britain imported in 1909 3,248,000galls. of Spanish wines as against 2,970,000galls. of French wines.

If the falling off of exports alone give any clue to the magnitude of the crisis, there appears to be good reason for the outcry of Spanish vinegrowers. Thus in a short period of 10 years—1897 to 1907—the total exports of wine fell from 117,816,206galls. to 34,947,830galls. This represents a fall in exports of over 70 per cent., quite sufficient in itself to jeopardise the position of the most firmly-seated of industries. The vinegrowing industry continues, nevertheless, to constitute an important source of national wealth, as the following figures clearly prove:—

Value of Spanish Exports connected with Vinegrowing Industry.

	1908.	1909.
	£	£
Common red wines	748,300	888,448
Sweet Malaga wines	812,334	600,892
Sherry and other dessert wines .	257,512	452,778
Common white wines	251,926	235,593
Raisins	844,704	764,260
Fresh grapes	493,000	414,040
Crude tartar	208,926	195,408

Total vine exports	£3,616,702	£3,551,419
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There is little doubt but that we are likely to be affected indirectly by this Spanish crisis, for in general character their wines more closely approach South Australian wines than those of any other country that I know of. The competition of Spanish wines on the London market are therefore more to be feared by us than that of the lighter French wines; and although the British Government is not likely to grant to Spain special concessions in this direction, it behoves us, nevertheless, to watch whatever action in this direction the Spanish Government may be driven to by the importunity of the vinegrowers.

MALAGA.

We left Seville for Malaga on October 23rd. In the early stages of the journey one passes in review a never-ending procession of olive trees. The visible horizon is crowded with them ; in the plains and on hill-slopes, in poor-looking country quite as much as in fertile-looking tracts. These trees, however, begin to thin out and finally disappear altogether as we ascend into higher regions. The approach to Malaga itself is as picturesque as it is unexpected ; from precipitous recesses we glide down on easy gradients to the sea-beach. First we penetrate the wild gorge of Hoyo de Chorro, and are soon threading an endless labyrinth of tunnels, whilst in the intervals of daylight we are vouchsafed glimpses of desolate mountain scenery, gigantic boulders and sheer cliff faces overhanging chasms and far distant torrents ; and then suddenly, as by enchantment, bursts to view the tropical luxuriance of the Hoyo de Malaga. Well down to the sandy beach the railway line is now bordered by an entangled growth of oranges, palms, pomegranates, figs, vines : a wonderful sight after the bleak grimness of the mountain passes.

In Malaga we did not tarry long, for neither general accommodation nor the town itself are altogether in keeping with the wild beauty of the surroundings. Malaga appears to be both a thriving seaport and an important industrial centre, in which neither the gospel of cleanliness nor general sanitary science appear to have made much headway, and the condition of streets and highways at this time of the year is the reverse of pleasant after the fall of the merest shower of rain. The general climate, however, is said to be ideal over the greater portion of the year ; and I can well imagine that such should be the case, although the fact that sugar-cane thrives in the vicinity would appear to suggest a certain degree of atmospheric oppressiveness at certain periods of the year.

Malaga has long been celebrated for the quality of its sweet wines, which the lapse of centuries has in no way impaired, albeit they are of the type that appeals more to the Latin than to the Anglo-Saxon palate. Within recent years, unfortunately, the unchecked ravages of the phylloxera have done much towards curtailing a once extensive vineyard area, and the wine output of Malaga is no more what it was some 20 or 30 years ago. Equally celebrated, and with good reason, are the Malaga table raisins ; I do not recollect seeing anything finer of their kind. The getting-up of these raisins for sale, so as to show them off to best advantage, is no neglected art here, nor did I meet with any attempts at the deliberate concealment of second-class and inferior fruit beneath surface layers of choicer description. Whatever was described as first-class I found to be first-class from top to bottom ; experience shows that such is not always the case elsewhere.

The gardens of Malaga appear to revel in luxuriance ; at the time, however, they presented a somewhat unkempt appearance which, on the whole,

is perhaps characteristic of autumn gardens all the world over. To my regret time did not permit of my making extensive inquiries into the agricultural methods of this most interesting strip of country.

GRANADA.

On October 25th we left Malaga for Granada, and soon found ourselves back again in the region of olive trees. We traverse some extensive and very well kept groves belonging to the Duke of Wellington, a gift from the Spanish nation to his illustrious ancestor of Peninsula war fame. As one approaches Granada one realises how much more thorough are general cultural operations here than anywhere else in Spain. The valley, or Vega de Granada, is very extensively irrigated and given up almost entirely to the cultivation of sugar-beet; and with very good reason, if I was correctly informed, since at present rates sugar-beet growing is said to return 10 per cent. on invested capital. The extent to which within recent years this crop has come to monopolise the district may be gauged by the fact that there are now 16 large sugar-beet factories in full working order in the Vega. I had occasion to look over one of these factories at a time, however, when no work was being done. This factory appeared to me to be well equipped on modern lines and very well kept. Its yearly output was said to be represented by 75,000 bags of sugar of 132lbs. each.

I was curious to learn what was done in this district with sugar-beet residues. In Northern France these residues were generally fed in the moist state to steers put up for fattening; special forms of disease have, however, I believe been traced to this method of using beet pulp. In this Spanish factory, after extraction of the sugar, the pulp is first partly dried by pressure and then transferred to specially-constructed kilns in which the drying process is completed with hot air. The dried pulp is then put in bags, going 75lbs. to 77lbs. each and sold as fodder to be fed either to horses, cattle, or sheep. The usual price realised is said to be about £3 15s. 6d. a ton.

I have already had occasion to point out that in this district sugar-beet growing is dependent wholly on irrigation; this, of course, tends to make of it a somewhat expensive crop, involving the use of much hand labor. The latter, however, is extremely cheap, being remunerated, I was assured, at the miserable rate of 1s. 6d. a day. As yet no attempt appears to have been made to grow sugar-beet in rotation with some other type of crop suited to local conditions. The common practice appears to be to go on raising sugar-beet year after year on the same plot of land, helping the crop along by occasional dressings of stable manure and guano. In this connection I suppose we should not forget that in this district the sugar beet industry is a comparatively recent one, and that for Spain it has hitherto proved an unusually profitable one; hence we may readily assume that in this somewhat improvident country every landowner is intent on making hay while the sun shines

without thought of the morrow. It seems highly improbable, however, on the experience of other countries, that even with the aid of irrigation growers will be able to continue indefinitely to draw from the soil, year in and year out, profitable crops of sugar-beet. At the present moment a good crop of irrigated sugar-beet is said to be represented in the Vega by 24 tons to 25 tons to the acre; the average yield of the district I was unable to ascertain. The roots are paid for by the factories on a quality test, much in the same way as our butter factories pay for milk. The juice of the roots is tested, and payment is made in proportion to its specific gravity, which will always correspond to its sugar contents. Payment is said to be made at the rate of 9d. for one-tenth of a degree of density (I was unable to ascertain what type of densimeter was in use). On an average this type of payment works out at £1 0s. 4d. to £1 5s. 8d. a ton of roots.

In Australia, wherever irrigation is made available, we usually fall back on lucerne and other forms of fodder that can be raised at little expense and fed to live stock. The idea of reducing labor to a minimum usually dominates our policy in this direction. It may well be questioned, however, whether in some special cases we might not find it to our interest to fall back on so profitable an undertaking as the sugar-beet industry over some of our irrigable districts. I am, of course, aware that the erection and equipment of sugar factories is a costly affair, not to be entered upon without some degree of certainty as to the success of the venture. Nevertheless, as Victoria did not hesitate to attempt sugar-beet raising without irrigation, why should not we test the matter with irrigation?

On the outskirts of the Vega I noticed that both olive trees and vines were occasionally irrigated.

THE SPANISH MULE.

Here, as indeed throughout Spain, the mule is the chief beast of burden and draught. The Spanish mule is on the whole a handsome beast, more attractive than the heavy French Poitou mules, although hardly as serviceable for heavy draught purposes. He is of alert, active appearance, with well-bred head, clean lean limbs, and well-shaped feet; rather light in the bone perhaps, but without that abnormal abdominal development characteristic of the heavier types of draught mules. The coat is usually smooth and glossy. On the whole, judged by our standards, the Spanish mule is more of a pack animal, and better adapted to lorry or dray than to heavy wagon work. These characteristics he may be said to owe to his sire and dam respectively. The former—the Spanish jack—alert, high-bred, clean-cut, is in striking contrast to his shaggy, ungainly cousin, the Poitevin jack; whilst the latter—a Barb mare for the most part—is considerably lighter than the French ideal “jument mulassiere.”

Teams abreast are no more in honor in Spain than anywhere else in the south of Europe. On the country roads and in the streets of towns are

constantly to be seen large two-wheel vehicles, of greater carrying capacity than our ordinary drays, drawn by a string of four mules in Indian file ; or not uncommonly three mules with a donkey in the lead. My earlier days had made me tolerably familiar with the various tasks it is customary to impose upon this humble beast of burden ; never before, however, had I seen it in this novel position of comparative ease and dignity well out of reach of the punishing lash.

We have not taken kindly to mules in Australia ; indeed, it is but rarely that one meets with them. And yet wherever one goes in the warmer regions of the globe one finds that for general purposes mules have been given the preference over horses. As draught animals if not as hacks they have many points in their favor : under adverse conditions of diet they are hardier than horses, they eat less, are less difficult in their tastes, less subject to disease and limb unsoundness, and they are generally longer lived. Against mules, on the other hand, it may be said that at times they are less tractable and staunch than the average horse, and in the popular mind, like all half-breeds, they are supposed to inherit all the defects of their parents and but few of their good points. Let us recognise, however, that the chief difficulty is the fact that the Anglo-Saxon does not love the mule, and unless in the future our immigrant increase be partly drawn from the South of Europe the mule, in spite of his numerous good qualities, is no more likely to become common in Australia than is the camel.

With all its squalor, its gipsies, its beggars, Granada is a wonderful city to visit. The interest attaching to it is mainly historical, for it is passing rich in the relics of glorious by-gone days. The Alhambra, that fairy Moorish palace overhanging the city and facing the snow-clad Sierra Nevada ; the stately Alameda ; the art treasures of the beautiful cathedral—one might have spent months of æsthetic enjoyment in the neighborhood but for the fact that time flies, and there was yet much to be done. And thus on the evening of the 28th of October, after a stay all too brief, we set out on the return journey to Madrid.

TOLEDO.

Whilst in Madrid for the second time we paid a hasty visit to Toledo, a curious old Moorish town, still celebrated as of yore for its steel and damascene work. The city and its general surroundings are picturesque in the extreme, albeit the stern grandeur of its monumental buildings can hardly be appreciated from its narrow, tortuous streets. Toledo, which must have been almost impregnable in days of old, dominates the plain from the summit of rough-hewn granite rocks. Almost completely encircled by the steep cliffs of the Tagus, it presents a most threatening, gloomy appearance from the left banks of the river. Here, by the bridge of San Martin, I run into the only flock of Merinos I was able to come across in Spain. It was raining at the time, and the flock had halted in the neighborhood of the bridge under

the protection of huge, wolf-like dogs, not unlike those I had seen similarly occupied in Greece some months back. These Merinos did not make a very brave show. They were no improvement on those pictures of the early unimproved Merinos that have been handed down to us by our forefathers. Long of limb, flat in the barrel, irregular in the backline, they were all that a sheep should not be. I cannot answer for the wool, as the sheep were too wet to be handled. I endeavored to secure some photographs of the flock, but weather conditions were too unfavorable for anything like success in this direction.

BARCELONA.

We left Madrid for Barcelona on the evening of October 31st. I tarried a day here as I wished to secure from the British Consul-General in this city, and from the Barcelona British Chamber of Commerce, information I had been unable to obtain in Madrid. Unfortunately I chanced on one of those numerous feast days, dear to the heart of the Spaniard. Public offices were all closed, and I had to fall back on published documents which the Consul was good enough to forward me. I was much struck with Barcelona; with its wide thoroughfares and its fine buildings, it is the most modern and least Spanish of the cities of Spain. It is by far the most important commercial and industrial centre of the Peninsula, and, it may be added concurrently, its most turbulent city. Barcelona boasts of about 550,000 inhabitants, most of whom are Catalans, many of whom do not even appear to understand Spanish. I was surprised to notice that everywhere in this city the names of the streets are always inscribed in two languages, Spanish and Catalan. The city itself is beautifully situated at the foot of the heights of Tibidabo, from the summit of which one enjoys magnificent panoramic views both towards the sea and the distant Pyrenees.

THE CEREALS OF SPAIN.

I have as yet said little of the cereals of Spain; and yet Spain, with all its other resources, may still be described as one of the great wheat-growing countries of the world. Unfortunately neither the time of the year nor the special localities that I visited were suited to inquiries in this direction. The following statistical data, however, will serve to show how great are the special cereal interests of the Spanish peninsula.

In 1907 the area under wheat in Spain was represented by 9,244,812 acres, and in 1908 by 9,391,803 acres. The total wheat harvest was represented by 100,121,241bush. in 1907, and by 119,718,075bush. in 1908, or general average yields per acre of 10·83bush. and 12·64bush. respectively. In the total area under wheat in 1908 are included some 503,030 acres of wheat that had been irrigated, and which yielded at the rate of 20·56bush. to the

acre, whilst the yield over the balance, or unirrigated area, was represented by 12·02bush.

When we recollect that the total wheat harvest of the Commonwealth in 1908, an excellent year, did not exceed 62½ million bushels, we must realise the importance of wheat to the relatively small area of Spain, and the efforts we are called upon to make if we wish to produce wheat in quantities at all proportional to our vast territory.

Nor has Spain neglected the other cereals, as the figures below will serve to show—

Spanish Cereals other than Wheat in 1907 and 1908.

Cereal.	1907.		
	Area in Crop. Acres.	Total Returns. Bush.	Yield per Acre. Bush.
Barley	3,602,862	51,346,170	14·25
Oats	1,200,362	13,570,034	11·30
Rye	2,254,222	25,135,994	11·15
Maize	1,122,482	23,630,306	21·05

Cereal.	1908.		
	Area in Crop. Acres.	Total Returns. Bush.	Yield per Acre. Bush.
Barley	3,507,340	66,671,704	19·01
Oats	1,224,810	22,444,394	18·33
Rye	2,273,097	24,599,120	10·82
Maize	1,146,577	18,734,665	16·34

Leguminous crops, too, appear to be grown very extensively for their grain, as figures below show—

Leguminous Grain Crops in Spain.

Cereal.	1907.		
	Area in Crop. Acres.	Total Returns. Bush.	Yield per Acre. Bush.
Kidney beans	634,372	4,324,500	6·82
Field beans	436,875	4,913,242	11·25
Chick peas	415,530	2,159,252	5·20
Vetches	173,410	1,302,554	7·51
Field peas	68,182	399,960	5·87
Lentils	31,902	209,510	6·57
Peanuts	18,755	672,503	35·86
Lupins	13,490	148,210	10·99

Cereal.	1908.		
	Area in Crop. Acres.	Total Returns. Bush.	Yield per Acre. Bush.
Kidney beans	641,345	3,978,931	6-20
Field beans	455,790	5,990,237	13-14
Chick peas	421,355	4,141,034	9-83
Vetches	159,303	2,132,966	13-39
Field peas	72,717	391,274	5-38
Lentils	37,142	428,472	11-54
Peanuts	18,875	502,150	26-60
Lupins	14,842	199,166	13-42

Additionally there were under carob trees in 1908 about 371,247 acres, which returned 86,452 tons of carob beans, or about $4\frac{3}{4}$ cwt. to the acre.

And yet, in spite of these returns, Spain is not a cereal-exporting country, nor apparently does local production come up to the food requirements of its 19 $\frac{3}{4}$ million inhabitants; indeed, at the present moment there appears to be an outcry throughout the peninsula to the effect that wheat, and consequently the wheaten loaf, is higher priced in Spain than anywhere else in the world. It is stated that less than half a century ago wheaten bread was worth in Spain from 2 $\frac{1}{4}$ d. to 2 $\frac{1}{2}$ d. the 2lb. loaf, whereas present ruling rates vary between 3 $\frac{3}{4}$ d. and 4 $\frac{1}{4}$ d. the loaf; hence much of the bread consumed in some of the Spanish provinces is made from maize, imported very largely from the Argentine Republic. The following figures, collected for the British Chamber of Commerce at Barcelona during 1910, will serve to show that wheat was higher in Spain than was the case in other parts of the world.

Average Price of Wheat on Various Markets in 1910.

	s.	d.	
Paris	5	5	a bushel.
Budapesth	6	3	"
Antwerp	4	10	"
Liverpool	4	10	"
New York	5	0	"
Chicago	4	8	"
Barcelona (Spain)	6	9 $\frac{1}{2}$	"
Madrid "	6	11	"

It is stated that during the course of the Spanish-American war there was a very general tendency on the part of prices of commodities to rise, in sympathy with the depreciation of currency and consequent high rates of foreign exchange. Exchange, however, is now approximately normal, but prices show no tendency to fall, and particularly the prices of wheat and bread. I may state that a very similar phenomenon has arisen in Greece: general

prices were at one time very high as a result of high rates of foreign exchange. In 1910, however, Greek money was actually at a premium in Greece, and yet there were no signs of a fall in prices. In both countries the mercantile community are accused of maintaining this reign of high prices for their own selfish ends. It is difficult, however, for an outsider to judge fairly of the position.

In 1909 Spain imported about £695,930 worth of wheat, and in 1908 about £777,520 worth; whilst of maize £1,025,260 worth was imported in 1909, and £1,519,260 worth in 1908.

I have already stated that the bulk of the maize appears to be drawn from the Argentine Republic; the imported wheat, on the other hand, comes almost entirely from Russian ports. In view of the high ruling rates in Spain, it may be asked whether Australian exporters might not find it to their advantage to look occasionally to Spanish ports as a suitable outlet for some of our surplus corn.

GENERAL IMPRESSIONS OF SPAIN.

Our short three weeks' visit to Spain came to an end on November 2nd, when from Barcelona we set out for Marseilles. The hasty impressions formed in the course of a flying visit do not perhaps go much beneath the surface of things, they have, nevertheless, a peculiar value of their own, in that they leave on the mind a panoramic record which closer and longer associations are too apt to efface. For the attentive observer a brief visit places everything in perspective, and thus he is perhaps better able to judge of the relative proportions and relationships of things, since as yet the woods are not hidden to him by the multitude of trees. Beyond these admissions, therefore, I offer no apologies for a few closing reflections on a country that I had often heard of, often read about, and always wished to see.

I quitted Spain with the settled conviction that it is a country that has received but scant justice at the hands of modern writers, or more correctly, perhaps, that my personal conceptions of the country had been hopelessly at fault. The picture of a helpless retrograde Spain, sunken in sloth and ignorance, the mere shadow of her former greatness, has not infrequently been drawn, and subconsciously, perhaps, for me this picture had represented reality. Indeed, it is no easy task for the Anglo-Saxon mind to visualise some other kind of Spain; both history and tradition alike would appear to forbid it. And yet quite other was the Spain that I saw in perspective during those brief three weeks: a virile country, of those to whom future ages promise much, and yet no more than the true reflex of its variegated past. A country, too, of untold natural resources and hidden wealth, the surface of which has been no more than skimmed. In these pages I have already adverted to some of the agricultural resources of the country. In this direction it may be said, with unusual relevancy, that Spain is essentially a land

of "corn, wine, and oil"; a land of broad rivers and almost unlimited irrigation supplies; a land of citrus trees and fruit trees of all kinds; of the chestnut and the cork oak; of rich lowland pastures and mountain summer feeding grounds. Indeed, there are few forms of agricultural activity possible under either temperate or subtropical zones that we do not find practised in some corner or other of this favored land.

On the other hand the mineral resources of Spain are also very considerable, and probably very scantily developed as yet. Iron, lead, copper, silver, pyrites, quicksilver, and salt are all important articles of export, representing in the aggregate from 10 to 12 million sterling annually.

Factories and manufactures appear to have become firmly seated in many centres; and although, according to the traditional standpoint, the balance of trade, as between imports and exports, is generally against Spain, the bulk of interchange involved is there to afford ample proof of great developmental activities. It is thus that in 1909 the total exports were valued at £34,299,185 and the total imports at £35,223,000.

That, in the way of development, much yet remains to be done in Spain cannot very well be denied; but so it must ever be with all countries that have any prospects ahead of them. Nor do I believe that long occupation of the soil by the same race, accompanied by inadequately exploited natural resources, is necessarily clear evidence of national retrogression, or even of stagnation. I take it that wherever a people has succeeded in maintaining its independence for centuries, its present can be read fairly only in the light of its past. It seems to me that we have here a nation that in the past has felt no special stimulus towards the development of its own natural resources. Circumstances and the national character made of it in past ages the conqueror of weaker nationalities; and, as usually happens in such cases, Spain left to others the uncongenial task of delving for her special requirements. And if we scan this past with impartial eyes we shall not be able to withhold admiration for the Spaniard and his acts. Scarce recovered from the thralldom of the Moors, we find purely fortuitous circumstances flooding sober, hard-working Spain with the easily won gold and silver of the newly discovered Americas. Now, wealth, however acquired, usually begets power, and great accordingly became the power of the Spaniard; but wealth acquired with unexpected ease from outside sources must have the effect of checking the development of the home natural resources, the exploitation of which will always involve less congenial forms of toil. In the end this dependence on others for the ordinary requirements of life may undermine the national character, and then disaster is close at hand. The easily acquired wealth of the New World had the effect of checking the home development of Spain; but the stern national character appears to have been proof against its more insidious inroads. The Spaniard has often been accused of ruthless intolerance in the days of his power; but intolerance, however much we may

deprecate it, was never yet the offspring of a weakly character. And it is this strength of character which made the Spaniard intolerant when power was his, which also saved him from effete degeneration in the days when wealth was to be had for the asking.

Spain's immense colonial empire is now a thing of the past, and once again the Spanish people are thrown back upon the unappreciated resources of their native soil, and already on all sides there are not wanting signs of national awakening. The general incongruities of the day, indeed, are good evidence of this; electric tramways and electric lights in the most squalid of villages and hamlets might otherwise seem altogether out of place. The people of the Peninsula are probably the most heterogeneous in Europe, and long political union does not appear to have brought about anything like social amalgamation, as has been the case in other parts of the world. And as each race has its special temperament so this association of races, which we call Spanish people, will find ample scope for the exercise of individual energies in a land that nature has so well endowed. Under the ægis of wise state-manship the future lies with the Spanish yeoman; in the North of Africa, in Algeria and Tunisia, whither lack of home employment has often driven him, there exists no sturdier workman or better artisan. He is in a position to seize upon the opportunities that are now arising, and therewith will build up a new Spain.

TUNISIA.

On the 10th November, 1910, I left Marseilles for Tunis, by the *St. Augustin*, of the Compagnie Transatlantique. The Blue Mediterranean is little more than a narrow land-locked lake; and yet when the Mistral blows down the Rhone Valley it can make things particularly unpleasant for the rather small vessels that run between the European and African coasts. Our mail-boat was none of the newest or of the best equipped—indeed I recollect covering the same distance with her some 20 years ago—and the troubled waves gave us no respite until we came within shelter of the beautiful gulf of Tunis. I had always looked forward to seeing the old well-remembered landmarks slowly breaking into view; but alas, this was not to be, for it was under the veil of night that we approached the African coast; and beyond the intermittent flashes of passing lighthouses, and later on the twinkling lights of the Carthaginian shore, all was hidden in darkness.

The town of Tunis is not a natural seaport; it is situated on the edge of a salt lagoon in communication with the sea, and enlivened at times by the

scattered ranks of rosy-winged flamingoes. In 1892, and earlier, vessels of any tonnage were compelled to stand out to anchor in the gulf at some distance from the coast; very much as was formerly the case with ocean-going liners at Largs Bay. In those times one landed at Goletta, erstwhile the Port Adelaide or Pyræus of Tunis, and thence proceeded to the capital by way of a railway line skirting the shores of the lake. All this, however, has been changed now; between the sea and the city of Tunis, the French have dug out a fairway through the lagoon; and to-day for all purposes of vessels that visit it, Tunis is a seaport and Goletta a living ruin.

We set foot on the wharfs of Tunis in the early morning of the 12th, exactly 18½ years since the time I left Africa for Australia; and great, in the meantime, had been the changes that had swept over this white eastern city. The European quarter of the town has changed almost beyond recognition; it has extended its boundaries, and encroached considerably on what was formerly country land; streets have been widened or diverted; an electric tramway service has superseded the old horse cars, and the heart of the city is now connected with its numerous country and suburban residences; avenues of trees have been planted or grown beyond my recollections; in brief, I found myself at first quite at sea in a city with which I was at one time thoroughly familiar. Alone, the Arab quarter, emblematic of the East in its contemptuous defiance of the bustling energy of Western civilisation, stands immovably the same. One notable innovation, however, could not escape my notice here; native shopkeepers have seen the advantage of acquiring the language of their conquerors, and to-day an European can make himself more readily understood in the bazaars of Tunis than in those of Cairo.

I had originally intended visiting Tunis in April or May, the late spring of the year in this part of the world, when the standing crops would have shown to best advantage; circumstances, unfortunately, compelled me to change my plans; and I now found myself in Tunis at the dead time of the year, with not a vestige of verdure to be seen anywhere. Weather conditions at the time were distinctly droughty, and seeding operations were impeded accordingly. I was not able to spend more than a fortnight in Tunisia, and although portion of this time was given to the country, for the bulk of the information collected I am indebted mainly to the Office of the Director of Agriculture, and particularly to M. R. Schilling, an old fellow student of mine.

TUNISIAN CLIMATE.

I have always thought that the North African coast, and particularly Tunisia and Algeria, presented far more points in common with the climate of South Australia than is the case with Southern Europe. And hence I take it that so long as economic conditions place no difficulties in the way,

any form of agricultural practice found to be successful in one country should prove almost equally so in the other. The fact, however, that the Regency of Tunis has for extreme southerly limit the great barren Sahara desert, tends to render general climatic conditions more trying to man and growing crops than is perhaps the case with us.

The Regency admits of being split up into four distinct districts, uneven in size and varying in rainfall, and therefore in agricultural possibilities, viz. :—

1. The extreme northerly district, which may be characterised as very wet, the mean rainfall varying within it from 24in. to 35in. This district consists of a narrow tract of country extending between the Port of Bizerta and the inland town of Beja.

2. The central district, which is described as moist, has a rainfall hovering around 20in. ; in area it represents probably about one-eighth of the Regency. This district may be said to lie between the towns of Tunis and Souk-el-Arba to the north and Maktar to the south.

3. Farther to the south we have a vast district described as dry, in which the mean rainfall varies between 12in. and 16in. This district lies between the towns of Sousse, Kairouan and Sfax.

4. Finally, to the extreme south and abutting on the Sahara Desert, we have the very dry district, within which the mean rainfall varies from 4in. to 10in.

Each one of these four districts has its due quota of mountain country, plains, and coastal areas.

Like South Australia, Tunisia does not come within the influence of tropical conditions ; hence, from the livestock breeders' point of view, it offers good winter pasture, but is dry and arid over the summer months. The general rainfall distribution is therefore very similar to our own ; the great bulk of the rain falls during the winter months, whilst those of summer, apart from occasional thunderstorms, are to all intents and purposes rainless. I take it, however, that the general advantage of climate is certainly with us ; for whilst our occasional summer north winds are undoubtedly accompanied by very high temperatures very trying to vegetation, their worst effects cannot compare with the intensity of those of the Sirocco, laden with the grit of the barren Sahara wastes. And when in the course of time the wind veers round to the north, it brings with it little relief. The remarkable falls in temperature accompanying winds blowing uninterruptedly over the ocean from the South Pole, so characteristic of our climate, are quite unknown in Tunisia ; for between this land and the cold north lie the summer-heated plains of Southern Europe ; all this contributes towards rendering the burden of the agriculturist proportionately heavier. With this reservation, then, I do not know of climatic conditions more closely approaching our own than those of Tunisia.

SOILS.

The total area of the Regency is said to attain to $32\frac{1}{2}$ million acres ; of these about $12\frac{1}{2}$ million are arable ; about $7\frac{1}{2}$ million more or less sandy wastes ; and the balance mountainous rocky country. The arable lands include the usual mixture of heavy and light soils common to all countries, although the heavier types would appear to predominate. As is the case with us, most of the Tunisian soils would appear to be abundantly supplied with both lime and potash ; in organic matter they are said to be somewhat deficient, a natural consequence of prevailing climatic conditions ; whilst in phosphoric acid, as is again the case with us, they are said to be generally poor.

THE MANURE QUESTION.

From what has been said of soils and climatic conditions, it will be gathered that the "manure question" is in Tunisia very much what it is in South Australia ; little or no call for potassic or expensive nitrogenous manures on the one hand, and great need on the other of soluble phosphatic manures, such as superphosphate. And indeed on all hands one hears the latter highly commended for local purposes, almost to the exclusion of all other manures. The dressing usually recommended appears to be about $2\frac{1}{2}$ cwt. to the acre. Notwithstanding the academic praise bestowed on superphosphates in this country, I could find no evidence of their having entered into the general practice of the farming community, as has been the case with us for some years past. Superphosphate is not manufactured in the Regency ; hence local usage must be accurately reflected by the local imports of this manure. I find Tunisian imports of superphosphate to have been represented by the following figures within recent years :—

Year.	Tunisian Imports of Superphosphate. Tons.
1905	895
1906	928
1907	1,482
1908	1,900
1909	4,888

It is clear that within recent years the imports of superphosphate have shown a tendency to rise ; but how infinitesimal a quantity are 5,000 tons for a country that has under crop each year between $2\frac{1}{2}$ million and 3 million acres.

In this connection it is worth noticing that within recent years Tunisia has joined the ranks of the raw phosphate exporting countries. How important a source of wealth this has proved to the country the following data will serve to show.

Tunisian Exports of Raw Phosphatic Rock.

Year.	Quantity.		Value.
	Tons.		£
1899	62,379	..	73,440
1900	168,239	..	149,925
1901	174,863	..	162,983
1902	258,798	..	214,388
1903	345,802	..	261,168
1904	447,658	..	327,790
1905	511,859	..	378,637
1906	770,982	..	695,960
1907	1,040,808	..	926,630
1908	1,277,319	..	1,128,675
1909	1,276,771	..	1,126,187

It is of course possible that to a limited degree the raw untreated phosphatic rock may occasionally be availed of by Tunisian farmers; indeed I find its use recommended at the rate of 9cwts. to 10cwts. to the acre in lieu of superphosphate. General conditions, however, of both climate and soil are so similar to our own that I find it hard to believe that the raw rock phosphate will prove any more satisfactory in Tunisia than it has proved to be in South Australia.

It is often stated of Tunisia that in the various cereal crops the proportion of straw present is, as a rule, excessive relatively to that of grain. I learnt with extreme surprise that by way of remedy to this state of affairs the use of organic manures, such as farmyard manure, was being advocated. On Australian experience, one would be inclined to think that the remedy proposed could have but one effect, viz., still further to accentuate the evil complained of.

CEREALS IN TUNISIA.

From the point of view of general agricultural operations, Tunisia may be described as being almost exclusively a cereal-growing country; it forms portion of that country that was formerly known as the granary of Rome. Official statistics show that nine-tenths of the area under yearly crops are represented by wheat and six-row barleys. The relative proportions of these two cereals are said to vary mainly with the mean rainfall of the districts concerned. Thus in the extreme north of the Regency, where the rainfall is always the heaviest, the area sown to wheat is, as a rule, one-third greater than that sown to barley; in the central districts, in which a 20in. mean rainfall or thereabouts prevails, the areas allotted to each cereal are usually about the same; whilst in the extreme south, where the mean rainfall varies from 8in. to 16in., and where proximity to the Sahara renders the climate exceedingly hot, barley represents about three-quarters of the area under cereals, and wheat only one-quarter. This fact would appear to emphasize

a contention of mine, to the effect that in the low-rainfall districts of South Australia six-row barleys will be found to be more resistant to drought than wheat, because the earlier and more rapid growth of the former will generally enable them to escape the full effects of early summer heat and drought.

Independently of questions of rainfall, it is customary in Tunisia to allot to barley the lighter types of soil, and to wheat the heavier ones. And, contrary to general South Australian practice, in Tunisia barley is generally sown before wheat.

The wheats almost exclusively grown in Tunisia are the flinty Macaroni wheats, belonging to the *Triticum durum* section; indeed they appear to be the only wheats ever grown by the native agriculturists. The following are some of the reasons usually given for the exclusive use of these flinty wheats:—Their great resistance to red rust; the fact that they are rarely lodged by rough weather; and that at harvest time they are less subject to the attacks of sparrows and other granivorous birds. The “bird question” has been given a curious solution in Tunisia, which I think worth quoting here. I was told that a public regulation was in existence to the effect that nobody shall possess in the country a tree the main trunk of which shall exceed 6ft. or 7ft. in height; in other words, for the special protection of standing crops it has been decreed that all tall trees shall be pollarded.

Numerous local varieties of these flinty wheats, all of which are bearded, are cultivated in the Regency, where the impression prevails that they are hardier and better able to withstand adverse climatic conditions than the soft wheats of Europe. Some years back, with a view to testing this fact, I imported from Tunis, for trial at Roseworthy, several of the best known of these varieties. After five consecutive years’ experience of them, it may be stated that they did not come up to expectations. I have summarised below in tabular form the results secured at Roseworthy, comparatively with the results secured from King’s White grown under similar conditions, and our general farm average.

Yields of Flinty Tunisian Wheats grown at Roseworthy comparatively with the Yield of King’s White and the General Farm Average Yield.

Years	1907.	1908.	1909.	1910.	1911.	Average
Rainfall	15.05in.	17.74in.	23.05in.	23.87in.	12.42in.	Yields.
Varieties.	Bush. lbs.	Bush. lbs.	Bush. lbs.	Bush. lbs.	Bush. lbs.	Bush. lbs.
Biddee	7 21	15 5	—	—	—	11 13
Msakny	6 24	15 38	—	—	—	11 1
Hmeera	7 15	17 16	27 54	21 18	—	18 26
Mahmoudi	6 41	18 46	36 13	30 1	11 50	20 36
Adjini	8 39	20 25	17 57	21 50	10 54	15 57
Khleefah	—	—	23 41	15 40	—	19 40
Soory	—	—	15 27	6 21	—	10 54
Ahweedjah	—	—	28 25	16 37	—	22 31
King’s White	33 10	27 31	29 10	23 27	17 00	26 4
General farm avrge.	13 20	22 14	25 5	16 38	14 17	18 19

It will be noted that these flinty wheats yielded satisfactorily in the wet seasons of 1909 and 1910, but were unsatisfactory in the dry seasons of 1907 and 1911.

The French "Colons" have apparently made various attempts to introduce into the Regency several of the soft wheats of Europe; and it is stated that whilst in favorable seasons the latter have carried heavier yields of grain than the local flinty wheats, the reverse has been the case in the dry seasons normal to this part of the world. Nor could I learn that these soft wheats, which are exclusively grown in Australia, have as yet acquired any particular importance in the farming operations of the Regency. The reason for this condition of affairs is not, I think, far to seek. In the first place, the Mediterranean countries absorb readily enough any surplus of flinty wheats that may be available for export. These wheats, besides being the ordinary foundation of macaroni paste, make a yellowish, dense, heavy loaf, which on the shores of the Mediterranean is more common than the usual European white loaf. Hence the marketing difficulties which we should have to contend with in Australia do not exist in Tunis as in so far as either type of wheat is concerned; and the only factor that might reasonably be supposed to lead to the substitution of soft wheats for the local flinty wheats must be represented by an unquestionable superiority in yields of the former. That this superiority in yields of the soft wheats has not yet been established in the Regency appears to me due to the fact that what we should term early varieties have not yet been introduced. I noticed with extreme surprise that the cold country distinction of "Winter" and "Spring" wheats appeared to be accepted in this country. Now a normal winter wheat is very much later than the latest of our wheats, and it does not appear to be realised in Tunisia that in hot countries it is only the spring type of wheat that has any chances of success, providing it be sown in winter. The soft wheats hitherto introduced by the French landowners are said to develop and ripen within 195 to 200 days, corresponding in this respect to the ordinary flinty wheats of the country. The latter, however, from the effects perhaps of long acclimatization, are better able to develop their grain in the teeth of heat and drought of adverse seasons. At Roseworthy we have now had five seasons' experience of these flinty Tunisian varieties, and in our experience they correspond to our mid-season wheats and not to our early wheats. Thus, if we take Mahmoudi and Adjini, which we have grown uninterruptedly for five years—1907-11—we find that on an average their periods of vegetation have been distributed as follows:—

Between germination and bloom	158 days
Between bloom and ripening	38 "
Between germination and ripening	196 "

These figures, it will be noted, correspond to those already given for Tunisia, and tend to confirm the similarity of climate commented upon. If, on the

other hand, we take an early variety of ours, such as King's White, over the same period of years and grown under similar conditions, we find its periods of vegetation to have been distributed as follows:—

Between germination and bloom	124 days
Between bloom and ripening	46 “
Between germination and ripening	170 “

It will be agreed that a difference in development of 20 days may affect yields very considerably in years of drought or of red rust. I conclude, therefore, as much of my knowledge of the general circumstances of the country permit me to judge, that the soft wheats are not likely to be accepted to any extent in Tunisia until landowners shall have secured early-maturing varieties such as those in common use in South Australia.

The barley usually grown is an ordinary six-row barley, resembling our Cape barley, but producing, as a rule, a better and plumper sample. Barley in Tunis—as is indeed the case throughout the Mediterranean country—completely supersedes oats as the corn of horses. And quite contrary to what appears to be the common opinion in South Australia, one hears oats—and not barley—objected to as having over-heating tendencies on the horses of hot countries. Much of the barley grown in the Regency finds its way, I believe, into England for malting purposes. I note that in 1909, England absorbed in this way 1,137,325 bush. of barley, valued at £175,768, or a little over 3s. a bushel. It is stated that European spring barleys and two-row malting barleys have generally failed when tested in Tunisia. I heard of an exceptionally early barley, known as Tripoli barley, occasionally grown in the dry districts of the extreme south and in some salt localities. It is said to mature its grain fully a month earlier than the ordinary local barley, and as such is extremely valuable in dry seasons. The grain of Tripoli barley, however, is said to lack the plumpness of the ordinary local variety.

Some French landowners situated in the heavy rainfall districts of the North, have experimented with oats, and are apparently satisfied with the results; and it appears that efforts are being made to spread the cultivation of this cereal, which is said to yield more heavily than barley. I doubt much, however, that oats are ever likely to oust the latter from its present position, excepting perhaps within the limited area of the heavy rainfall districts. There is a curious advantage that attaches to the growing of oats in Tunisia, a cereal wholly unknown to the Arabs prior to the French occupation. The growing of both wheat and barley is still subject to the old native tax in kind—nominally one-tenth of the yield. Oats, formerly unknown to native chancellors of the exchequer, altogether escape direct taxation, and start therefore with a distinctly favorable economic handicap.

To a very much less degree, in the way of summer grain cereals, maize, sorghum, and durrah are grown, generally over small areas situated within the immediate neighborhood of wells, from which irrigation supplies are drawn. Occasionally when winter cereals have failed, or are likely to prove below the immediate requirements of the native and his family, summer cereals are risked where no means of irrigation are available; and, thunderstorms helping, at times they succeed.

The table below will convey some idea of the importance of the various cereals to Tunisia within recent years.

Mean Production of Cereals in Tunisia, 1907-09.

Cereals.	Average Area.		Average Production. Bush.	Average Yield per Acre.	
	Acres.			Bush.	Lbs.
Wheat	1,068,328	..	5,536,667	..	5 11
Barley	1,152,360	..	7,496,135	..	6 25
Oats	112,500	..	2,927,831	..	26 0
Maize and sorghum .	48,333	..	200,215	..	4 6

The figures in the table above refer to the averages of three seasons; and from our point of view, with the exception of oats, the yields shown are certainly exceptionally low. It should be stated, however, that of the three seasons under consideration, one of them—1908—was characterised by extreme drought, which caused the bulk of the crops in the drier districts to fail almost completely. I notice that in the season that followed the Government was compelled to adopt special relief measures for those who were left practically without means of support. They distributed among native landowners £69,000 worth of seed wheat and barley, and started various forms of relief work for those who were without means of earning a livelihood. Amongst other measures adopted for the purpose, a special new coin was issued of a face value of one centime, *i.e.*, 0.095 of a penny, or about a third of a farthing. This, it was thought, would enable destitute natives to make the infinitesimal purchases that would keep body and soul together.

Nor in considering these yields should it be forgotten that they represent the aggregate results of both Arab and European farming. The farming practices of the Arabs could not be more primitive—representing no advance on those of the ancient Romans. French landowners, on the other hand, have for the last 30 years been endeavoring to adapt improved modern European methods to the special climatic conditions of Northern Africa. In this connection the various problems that have confronted them are very much the same as those we have had to face in South Australia. It does not appear to me, however, that they have been quite as successful in solving them as we have.

ARAB CULTIVATION METHODS.

Weather permitting, the Arab will start breaking up his land with the most primitive of ploughs in the early autumn. In this plough—beam, body, and single handle—all is of wood, with the exception of the iron lance-shaped share, which is no better than a heavy cultivator tine; there is no mouldboard. A plough of this sort can do no more than score on the surface of the earth an irregular series of tortuous open furrows, the mound of earth between each remaining untouched. The absence of mouldboard of any kind implies that the furrow is never turned, nor are weeds ever buried under. Later on in the season the seed is hand broadcasted over the rough surface, and covered by a second ploughing with the same implement, given at right angles to the first. Frequently, however, early autumn rains fail, and the first ploughing cannot then be given. When such is the case, the seed is merely scattered over the surface of the hard, untilled land, and subsequently covered by a single ploughing. As might well be anticipated, crops put in in this fashion are invariably dirty; and if he can overcome his national laziness, the Arab will, at times in the spring, drive out the whole of his family to do a certain amount of hand weeding.

The harvesting tool of the Arabs is the sickle, or reaping hook. They cut off the ears with 6 in. to 8 in. of straw adhering to them, and waste more time in tying the ears into a short sheaf than they take to gather and cut the latter off. The whole of an Arab's family invariably follow him as gleaners, on the generous principle that the harvest field must support its harvesters. It is stated that in the fields of the natives gleanings absorb an amount of grain equal to that sown. Gleaning is therefore a heavy tax on fields which on the average do not yield more than five to one of the seed sown. These small sheaves are gathered together in rope nets made for the purpose, and loaded on the backs of mules or horses, which convey them to the threshing floor. It is stated that in average years each horse load of sheaves yields on threshing about 2 bush. of grain, and that in the course of a day's work each horse will make at the outside 10 trips between the field and the threshing floor. The threshing floor is specially prepared by beating to a smooth surface a suitable piece of ground, which has previously been moistened and smeared over with cow's dung. On this floor the sheaves are spread out in even layers. When all is complete, horses are harnessed to a sort of sledge, armed on its under surface with blunt knives, or at times merely sharp stones. The driver stands on his sledge and drives his horses round and round the floor until the grain is judged to be completely threshed out. This method of threshing has a double purpose; it both threshes out the grain and chops up the straw into small pieces, which, with the adhering chaff envelopes of the grain, forms the main standby of native live stock. As in Bible times, it is the wind of the heavens that winnows out the grain

of the threshing floor. It is generally estimated that two men and two horses and sledges will thresh out about 15 bush. of wheat a day, and about twice as much barley.

EUROPEAN FARMING PRACTICES IN TUNISIA.

The uniformity of practice which characterises the farming operations of the natives cannot be expected in those of the French "colons," for the former have inherited ancestral methods rendered rigid by the experience of centuries, whilst the latter have been groping more or less successfully after new methods during the course of the last 30 years. The average yields of the successful French farmer are naturally superior to those of the thriftless Arab. On the other hand, his general expenses are very much heavier, and it appears questionable at times whether his net profits are very much greater than those of the Arab. It is even stated that on some French farms, in spite of the use of modern implements, yields at times fall even below those of the natives.

One would imagine that the bulk of the country is admirably suited to our general practice of one year's bare fallow before a cereal. So far as the native is concerned it would perhaps be asking too much of his forethought to expect him to break up land in the middle of one winter, keep it clean throughout one season, and then sow it to wheat the following winter. In some few districts, however, the Arabs appear to break up their lands lightly in spring or summer in anticipation of the rains of the following year. This practice, however primitive, is nevertheless quite exceptional. In this connection, however, the general practice of the French landowners does not, to our ideas, appear very much better. Many of them apparently wait for the autumn rains to break up their land for seeding purposes. It is true that this work is carried out with modern ploughs, and to this extent is better done than that of the Arabs. The most advanced amongst the colons practice what they call "spring ploughing," but make no attempt apparently towards working down the land to a suitable condition of tilth, or maintaining it free from weeds. Nowhere did I come across what we should call well tilled fallow land ready to receive the winter seeding which was surely at hand. Further proof of this, were it needed, is to be found in the fact that the seed drill, universal with us, can find no place in Tunisian agricultural practice, mainly, it is stated, because at seed time Tunisian fields are far too rough in condition to admit of the use of the drill.

In an official report (*La Culture des Cereales en Tunisie*) I find set out a statement representing the cost of growing wheat in Tunisia to the French landowner. I give this estimate below in all its details, because it throws some curious sidelights on the type of cultivation that appears to have received official sanction in the Regency.

Cost of Production of an Acre of Wheat in Tunisia.

	£	s.	d.
Two years' rent on land valued at £6 8s. at 4 per cent. per annum..	0	10	3
<i>Spring Ploughing—</i>			
1½ days of six bullocks, i.e., 9¾ days at 9¾d.	£0	7	8
1½ days ploughman at 2s.	0	3	2
1½ days driver at 1s. 2d.	0	1	11
<i>Summer Ploughing—</i>			
1½ days of four bullocks, i.e., 4½ days at 9¾d.	£0	3	10
1½ days ploughman at 2s.	0	2	5
Seed, 75lbs. at 4s. 4d. a bushel		0	6 3
Ploughing before seeding (same as summer ploughing).....		0	5 6
Two harrowings at 1s. each		0	2 0
One rolling		0	1 0
Binding, stooking, and carting		0	8 0
Threshing and carting to railway station.....		0	4 10
General expenses.....		0	3 2
Total cost of producing and marketing one acre of wheat.....	£3	0	0

Thus, then, according to the compiler of this estimate, with labor at from 1s. 2d. to 2s., it costs the French landowner £3 an acre to produce and market an acre of wheat; and he adds that a yield of 13½ bush. of wheat, at 4s. 4d. a bushel, barely covers out of pocket expenses. It is hardly worth while criticising this estimate, so copious in the details of some operations, so meagre in information concerning others. It might otherwise be pointed out that several important items appear to have been overlooked, such as superphosphate, which elsewhere the same writer strongly recommends at the rate of 2½ cwt. to the acre, the cost of seed distribution, &c.

This estimate, however, if at all representative of general Tunisian practice, gives us a very fair insight into what is thought to be good preparation of the land for wheat. In the spring of the year, when presumably the bulk of the feed has been fed down, we see a plough team of six bullocks, in charge of a ploughman and a driver, tearing up the land at the rate of little over half an acre a day. For the power and labor engaged this is, indeed, slow work; and we must infer therefore single-plough work, and great depth of ploughing at that. No further provision appears to be made for later treatment of the land, until it is ploughed a second time in summer with a team of four bullocks, under sole guidance of the ploughman, and this time at the rate of about five-sixths of an acre a day; evidently, therefore, still slow single-furrow work. It would appear that after this summer ploughing the land is left in the rough loose state until seeding time, when it is ploughed a third time—at the rate of five-sixths of an acre a day. In the circumstances we need have no further reason to wonder that at seed time land so treated should be found too rough for the drill; indeed, to our mode of thinking, it must be a matter of considerable surprise that land tilled on the lines indicated can ever be made to carry a payable crop of wheat, excepting perhaps in the most favorable of seasons. One can understand, too, that at times the

yields of the European farms should fall below those of the natives with their primitive methods.

For harvesting purposes the French landowners make universal use of the mower and binder and steam-threshing machinery. I have heard Arabs deploring the practice. "It left nothing behind in the field for the poor," they said. Apparently Australian complete harvesters have been tested in Tunisia, and it is said been found wanting. It seems probable that they were not placed in the hands of men familiar with their working. Apart altogether, however, from any question of their efficiency in the harvest field, I am more than doubtful of the general usefulness of the complete harvesters in a country in which labor is always abundantly available, and in which cereal straw is valued as an essential bulk foodstuff for livestock, in conjunction with barley grain, and occasionally oats.

FORAGE CROPS.

From what can be gathered, it would appear that the question of "forage crops," using the term in its widest acceptance, has always been an acute one in the Regency; nor, apparently, have any appreciably forward steps towards its solution as yet been taken. Although the rank spontaneous growth of land temporarily out of cultivation is occasionally cut and sundried, good hay, in the European sense of the term, is rarely if ever made. Nor has Tunisia yet realised that in dry countries the wheat field must contribute its own share towards its upkeep in the shape of wheaten hay. In glancing over various discussions that have been published on the subject one is very forcibly impressed with the notion that where forage crops are concerned the French colons appear to be particularly anxious to get something for nothing. The chief, and perhaps the exclusive, aim of Tunisian agriculture appears to consist in getting under grain crops every year as vast an area as circumstances permit of; and effort and labor expended in any other direction is not only begrudged but not even to be entertained. On the other hand, the association of livestock with general farming operations is as consistently advocated in Tunisia as it is with us. Indeed I find this association repeatedly referred to as the only economic measure calculated to restore some measure of fertility to soils exhausted by centuries of cultivation. But if all efforts are to be limited to the production of grain crops sold off the farm, how are livestock to maintain themselves, even when reduced to the strict minimum of ordinary working horses? Apparently in the better districts some of the landowners occasionally have recourse to oaten hay, with which vetches are sometimes mixed; but even this practice I have seen gravely censured, on the grounds that oaten hay could not be grown without the aid of tillage, which might have been employed to better advantage in the raising of saleable grain crops.

As is the case with us, when land is left out of cultivation in Tunisia it carries very tolerable winter feed, representing to the livestock of Arab owners a short-lived horn of plenty. In the six or seven dry months of the year, however, annuals make no further growth, except in a few favored spots; and, when what little is available on the stubbles has been consumed and trodden under foot, livestock not only lose condition but must face inevitable starvation, unless relieved from the hoarded stores provided by the forethought of man. And with the natives these never go very far; the small heaps of chopped straw and chaff that accumulate round the native threshing-floors are usually doled out with occasional handfuls of barley to their working horses and bullocks. Sheep, on the other hand, earn their livelihood on foot. In charge of knowing shepherds they roam from one end of the Regency to the other in search of food, which is paid for either in kind or at a fixed rate per head. On the whole, even in the most favorable of years, the condition of the livestock of the Arabs is usually deplorable by the beginning of winter; whilst in years of drought they die away like flies, or may be purchased for a mere song.

In some respects the French landowners are even less favorably situated. They may be said to have endeavored to adapt themselves to the methods of the Arabs, without, however, possessing the inherited instincts of the latter to turn them to best advantage. The flock of the French colon, for instance, cannot travel when feed gives out on his own land, except in the care of the Arab shepherd, who alone possesses the necessary experience of the available feeding grounds; and when at a distance he is apt to think more of his own special interests than of those of his master, for ancient custom has decreed that he shall be part proprietor of the flock. And since the time of Jacob this arrangement has always proved a rather one-sided one. Hence the opinion very common in Tunisia that sheep are profitable only in the hands of an Arab proprietor.

The French proprietor, albeit possessed of inherited Western forethought for the morrow, is almost equally at a disadvantage where the feeding of horses and horned cattle are concerned. In this special direction the adoption of modern tillage and harvesting machinery has not improved his lot. They have converted his stubbles into less valuable feeding grounds than those of the natives, in which without particular difficulty sheep can find the means of gleaning even behind the gleaners; whilst the long straw and summer growth of the native stubbles are of value to horses and cattle alike, besides returning to the soil some portion of the humus, so essential to its good mechanical condition in all hot dry countries. The French landowner, in the great majority of cases, owns no hay; but he knows that for centuries, in the absence of natural feed, the Arabs have fed their horses and cattle on straw and a little barley grain. Hence he thinks himself compelled to follow the example of those who alone are possessed of secular experience;

and in the neighborhood of every French farm steading we see accumulating huge stacks of straw to meet the supposed requirements of the farm livestock. But the question arises, is it straw that the Arab feeds to his livestock? Is it not rather mainly the chaff envelopes of the grain, which are admittedly of greater feeding value, mingled with grain that has escaped slovenly winnowing processes, together with a little crushed and bruised straw? Whatever may be the case, there is little doubt but that both horses and cattle take more readily to the straw heaps of the Arabs than to the clean straw of the French threshing machines. The French landowner grows wheat more readily than barley, and oats only in favored localities; and unfortunately the hard stick-like straw of the flinty wheats usually grown, always fed long, is the type of straw least acceptable to livestock. Hence the French landowner finds himself compelled to meet the acknowledged defects of his straw as a foodstuff with abnormally large rations of barley; all of which, in the long run, has a tendency to shear away what may be left in the way of net profits.

Without hay as a standby, and with perhaps even less natural summer feed than we can boast of in South Australia on an average Lower North farm, it is easy for us to realise the difficulties of the Tunisian farmers who would combine livestock operations with the growing of crops. Notwithstanding well-intentioned official advice to the contrary, in actual practice I fancy that the average French colon reduces his livestock to the irreducible minimum of unavoidable working horses. Indeed I heard that one farm, at all events, had even gone a step further in a more or less successful attempt entirely to replace working horses by electricity. It is true that one hears that cattle are occasionally found grazing with advantage on some of the favorably situated farms of the northern districts of the Regency. For the most part, however, these represent more or less dubious speculations rather than systematically legitimate associations of livestock and farming. In the main, I think, it may be stated without exaggeration, that for the present the flocks and herds of the Regency continue in the hands of the Arabs.

I notice that unirrigated crops of maize and sorghum are recommended for summer forage purposes. It appears to me, however, that apart from exceptional seasons, these crops are no more likely to prove advantageous than is generally the case with us in the Lower North. Kale and the forage cabbages generally appear also to have their special advocates. No doubt, under careful management, these winter crops will afford later grazing than the spontaneous weed growth of a field temporarily out of cultivation; and to that extent they may prove helpful. They cannot be said, however, to solve the problem of a suitable supply of summer feed. Vetches, too, appear occasionally to be grown, either alone or in conjunction with oats. It is customary to utilise them in the form of hay, trusting to a good grazing aftermath, in the event of a showery summer.

In the extreme south of the Regency, in the neighborhood of holy Kai-rouan, where droughts are rather the rule than the exception, for many generations the Arabs appear to have cultivated for forage purposes the spineless prickly pear. Magazine writers are very fond of attributing the creation of this plant to the magic skill of Luther Burbank; as a matter of fact it has been in cultivation long before the American plant breeder saw the light of day. This useful cactus, once well established, is said to be altogether indifferent to the nature of soil in which it is planted, and equally so to drought and extreme heat. I have myself seen it flourishing on the summit of a ruined Roman aqueduct, some 30ft. to 40ft. from the ground. The spineless prickly pear offers an abundant supply of succulent feed at a time of the year when nothing else is available. The flat sections of the stem are detached and chopped up into suitable slices; apparently only every other year, for fear of injuring the general growth of the plant. It seems a pity that this spineless cactus should not have been given a trial in some of our drier districts; there is no doubt that in times of drought it would prove of inestimable value.

The making of ensilage appears to be officially advocated, particularly in so far as adventitious rank spring growth is concerned. I could not learn, however, that farmers had taken to the practice whole-heartedly.

SULLA.

Sulla, or as it is known here, Spanish or Maltese clover, *Hedysarum coronarium* of botanists, is a forage plant indigenous to Tunisia, as also to much of the littoral country of the Mediterranean. Within recent years it has received much attention in the Regency, and as it may possibly present some interest for us, I have reserved for it a special place in the discussion of forage crops.

This plant, which is somewhat akin to sainfoin, is found growing spontaneously in the northern districts of the Regency, *i.e.*, in districts in which the mean rainfall may be said to vary somewhere around 20in. It is at its best in rich alluvial flats, on which it makes strong rank growth, sometimes attaining to 3ft. and 4ft. in height; whilst on dry hill slopes it is more or less stunted, but still offers very good grazing. Like all leguminous plants it appears to call for a good supply of lime and phosphoric acid in the soil, but appears to be more or less indifferent to its humus contents.

Sulla, like all the leguminosæ, carries on its roots special swellings, in which are to be found nitrogen-collecting bacteria, living in symbiosis with the plant. It is stated that these bacteria are of a type peculiar to sulla, and generally not to be found in soils in which the plant had not been previously grown. In soils of this kind the growth of sulla is said to be very poor until the bacteria have been artificially introduced. I notice that in Tunisia it is recommended that when new land is being laid down to sulla, about

3 tons to the acre of surface soil from an old sulla field should be scattered over the surface of the field in cloudy, moist weather. I may add that for some years past we have grown sulla on a small scale on the Roseworthy Agricultural College Farm, and have as yet experienced no particular trouble in this direction.

There are said to be several varieties, or perhaps even species, of sulla. So far as can be seen, however, the differences adverted to do not appear greater than might be expected from a general change of environment.

Sulla is stated to be normally in Tunisia biannual, or even at times annual. Our experience of it at Roseworthy would tend to show that it is perennial so long as it can be maintained alive through the summer months.

A field of sulla may either be grazed or cut for hay. It makes a rather coarse hay, which needs very careful handling, because of its tendency to lose its leaves on drying, as is the case with lucerne hay. The hay yields appear to vary within fairly wide limits, from a little over a ton to the acre to 4 tons and 5 tons in very favorable conditions.

Sulla appears to be grown fairly regularly in both Malta and Southern Italy, and for some years past French landowners have been endeavoring to find a place for it in the rotation of Tunisian crops; as yet, however, its position does not appear to have been definitely settled. Thus some would sow sulla in a cereal crop, very much in the same way as red clover is sown in England in a spring barley, or as lucerne is sometimes sown by us in a cereal crop. Others again, following the usual Maltese practice, prefer sowing it on a cereal stubble.

Connected with the position to be given to sulla in ordinary farming operations are certain germination difficulties which can be most conveniently dealt with here. Sulla seed is enclosed in an outer shell or husk, endowed with strong powers of resistance to the ordinary agents of decay, whence arises a very tardy and irregular germination. So much is this so that it is said that for successful growth sulla in the husks must be sown a year in advance of actual requirements. Thus, if sulla seed in the husk be sown in an autumn cereal it will not germinate until 12 months later in the stubbles of the cereal crop. This fact naturally represents a serious difficulty in the handling of the crop, and various attempts have been made to overcome it, some of which may be quoted.

It would appear that Maltese and Sicilian growers are in the habit of storing away the seed for 12 months in an air and water tight pit, in which a sort of fermentation sets up, with the result that the grain, when sown, germinates fairly freely. M. Schribaux recommends boiling the seed. According to him seed and husks immersed for 5min. in boiling water will show a 95 per cent. germination as soon as brought in contact with moist earth; whilst 10min. immersion gives rise to a 75 per cent. germination. The seed should be sown within 48 hours of treatment. M. Wartelle has modified this treatment

by immersing the seed for an hour in a 1 per cent. solution of carbonate of soda, or washing soda, at a temperature of 122° F. According to him, this treatment has been responsible for an 85 per cent. germination. M. Delanoue found that by merely exposing the seed in its husks to the action of summer weather throughout the summer months he obtained in the following autumn an 85 per cent. germination. Hence he recommends the sowing sulla seed in the husks over a cereal stubble as soon as the field is free of harvesting operations, and that without covering it. Apparently moderate grazing of the stubbles in the summer months does not interfere with the regular germination of the seed in the following autumn, on the fall of the first rains.

Finally, milled seed, freed of the husks by a special mechanical process, may now be secured. It is said that they give rise to an 80 per cent. germination shortly after sowing. Unfortunately milled seed is very much more expensive than the seed in its husks.

I owe these details on the germination of sulla to an article from the pen of M. R. Thillard, published in the 1909 *Annuaire* of the *Ecole Coloniale d'Agriculture de Tunis*.

Is sulla likely to prove of any use to us in South Australia, and if so, how should it be handled? This is a question which cannot very well be answered without definite experiments on the subject. I am inclined, however, to think that in 20in. rainfall country, and on good land, it is likely to prove useful either as a grazing crop or as a leguminous hay crop. We have already grown it at Roseworthy in the past, but do not appear to have understood its general management. I propose, therefore, giving it a fairly extended trial, although perhaps our rainfall conditions are somewhat below what appear to be the special requirements of sulla. The seed, either milled, or, if in the husk specially treated as indicated, should be sown in a cereal hay crop at the rate of 13lbs. to 16lbs. to the acre if milled, and at the rate of 60lbs. to 70lbs. to the acre if in the husk. It should be broadcasted after the drilling in of the cereal hay crop, rolled in with a corrugated roller if the seed is milled, and lightly harrowed in if it is in the husk. Germination will take place at the same time as that of the cereal crop, in the shelter of which sulla will make fair growth. It will be cut down at the same time as the hay crop, to which it will prove a useful addition. It will probably be wiser not to graze the stubbles in the summer, and on the fall of the first autumn rains the sulla will make rapid growth, and become available for grazing early in winter. Or again, the sulla may be allowed to make full growth and be cut for hay when in full bloom. Whether the plant will persist in the ground as a perennial plant remains yet to be proved. If merely grazed, however, it seems probable that in ordinary circumstances it will find the means of going to seed, and reappear from time to time in the field in which it had been sown originally.

LIVESTOCK.

The typical country Arab, unlike his cousin the Moorish artisan or shop-keeper of the cities, has the blood of many nomadic generations in his veins. Surrounded by his flocks and herds, he lives in the shelter of camel's hair tents, which can be struck at a moment's notice; or else in huts of brushwood and mud, very rapidly put together, and at no more expense than that of a little uncongenial labor, which for the most part, however, falls to his womenfolk. Contemplative and ease-loving, beyond the bare necessities of life, his wants are of the slenderest. He has all the Oriental's dislike of manual labor; and if the earnings of a month or two of toil suffice to keep body and soul together for a twelvemonth, he can rarely see any good reason why his usual 10 months' holiday should be encroached upon. But even in the Arab's well-regulated life exceptional cases will occasionally arise; as, for instance, when he is bent on acquiring the wherewithal to purchase a wife. These traits in the character of the Arab make of him, perhaps, a better herdsman and flockmaster than he has been shown to be an agriculturist. It is customary to extol him as a breeder, particularly in the matter of horses. In this connection it is much to be feared that the latter-day Arab lives very unworthily on a reputation built up in the uncivilised days of a distant past. It is unquestionable that among the Arabs many an individual has inherited an instinctive knowledge of the good points of a saddle horse; and that at times a favorite charger may receive from an Arab quite as much attention as a member of his own family. In the main, however, the Arab's philosophy of life is summarised in a blind confidence in a beneficent Providence, which, in his view, altogether absolves him from any need to provide for the future. In the circumstances it is little to be wondered that the flocks and herds of the Regency alternately contract and expand, according as the seasons are able to kill them off, or, more rarely, are not able to put any special obstacle to their indiscriminate multiplication. The figures below, having reference to the livestock of Tunisia in 1907 and 1908, afford a good illustration of these facts.—

Form of Livestock.	1907.	1908.	Loss. Per Cent.
Sheep.....	833,562	585,027	30
Goats	476,386	342,249	29
Cattle	158,062	159,272	—
Camels	115,748	106,175	8
Asses and mules	94,594	79,190	16
Horses.....	31,870	28,772	10
Pigs	14,644	10,771	26

The year 1908 happened to be a period of drought, during the course of which, as will be seen, much of the livestock of the Regency perished. The

figures for 1909 were not available at the time of my visit. It would appear, however, that still further reductions in the livestock of the country were anticipated.

SHEEP.

From the point of view of numbers, sheep form the principal livestock of the country. I have already stated that the average French landowner has not yet learnt how to turn sheep to profitable advantage on an ordinary farm, and that, in consequence, the flocks of the Regency are mainly in the hands of the natives.

The typical sheep of Tunisia is the fat-tailed sheep, so common in Asia Minor and Syria. In many ways, from our point of view, this sheep is all that a sheep should not be. The coarse, short wool is more like hair than



Tunisian Fat-tail Sheep.

wool; the belly and legs are bare; whilst rough treatment and thorny bushes frequently make short work of what little wool nature meant to grow on the back. The clip of a flock is said to be of so little value as barely to account for the remuneration of the shepherd. Nor can it be said that as purely mutton sheep their general bodily conformation is good. They are lanky, with badly-developed legs of mutton, irregular back line, and heavy heads. The flesh, too, is rank and tallowy, usually selling at unfavorable rates both on the French and local markets. And yet the Americans are said to have evolved out of these defective sheep a breed which they have called Tunis sheep, and which they highly extol as producers of early lambs. This breed has, I believe, found its way into New Zealand, although with what degree of success I am not aware. There is only one explanation that

occurs to me as tending to account for these unexpected American results. The tail development of the Tunisian fat-tail sheep, although not perhaps equal to that of some of their Syrian cousins, is nevertheless very considerable. The breadth of the tail entirely screens the hindquarters, whilst its length



Carcass of Asiatic Fat-tail Sheep.

always falls below the hocks. This monstrosity of a tail so much hinders natural processes that the rams, which are allowed to run with the ewes from one end of the year to the other, are quite unable to serve the latter without the aid of the shepherd. This tail is no more than a huge mass of fat, which, when melted down, forms the cooking fat mainly used by the poorer

classes. It is easy to conceive how, in the course of centuries, so unnatural a tail may have been evolved amongst a people otherwise indifferent to, and perhaps ignorant of, the potent action of continuous selection. Here was part of a butcher's animal having a distinct commercial value of its own well apparent to all; and in picking out his rams the Arab or Syrian shepherd, as is the custom at the present time, paid almost exclusive attention to tail development. Unconscious selection of the kind extending over many centuries has, therefore, in all probability been responsible for the abnormal and functionally useless tail of the fat-tail sheep. It should be added, too, that this tail must form a sort of reserve upon which the animal can draw for a time in days of stress and starvation. It seems to me that this cult of the abnormally fat tail must have had the effect of breeding into the breed an exaggerated tendency to lay on fat, quite as much as Bakewell's artificial treatment of the Dishley Leicesters. If the tail be suppressed in early life, I take it that the tendency to lay on fat to an abnormal degree will still be retained, and in the absence of the tail will be deposited more evenly over the body. Hence, I take it, the explanation of the success of the Americans with these sheep in producing early fat lambs.

The Tunisian Government appears within recent years to have made strenuous efforts to displace the fat-tail sheep from the flocks of the Regency. To us their present aim will appear modest enough. They favor on the one hand what are described as the "Algerian Thin-tail Sheep," which are said to be superior to the ordinary Tunisian sheep both as producers of mutton and of wool, although from our point of view still a very inferior breed of sheep; and on the other hand the Merino of La Crau, a barren stony plain of the south of France. This sheep may be described as an inferior type of short-wool Merino. The professional advisers of the Tunisian Government argue, however, that coming as it does from very poor pasture land, it is more likely to succeed in the hands of the Arabs than the better types of Merinos that might otherwise be secured. The Government have undertaken the importation of rams of these two breeds at their own charge, distributing them amongst likely applicants at bare cost price. It is stipulated, however, that those securing Government rams must agree to exclude from their flocks for a period of at least three years all fat-tail rams. Applicants must also be in a position to show that they can afford suitable shelter for their flocks, and adequate forage supplies to tide over the lean portion of the year.

I took the opportunity of bringing under the notice of the authorities the South Australian Merino, which in my view would find in Tunisia pasture conditions somewhat analogous to those obtaining here. In other directions, however, conditions are perhaps not altogether similar. Tunisia is an open, unfenced country, in which all flocks must constantly be under the eye of the shepherd, one of whom generally tends 200 head. At night the flocks

are generally placed within the shelter of temporary enclosures, built up as a rule out of the thorny bushes common to the country. This practice appears to be absolutely necessary as a protection against the jackals, which do quite as much damage as our own wild dogs. For the protection of the sheep the shepherd is always provided with watchdogs and gun and ammunition. Whether our Merinos, long accustomed to roam at their ease, would readily accustom themselves to this species of treatment, is of course open to question. To overcome the native shepherd's ineradicable prejudice against tailless sheep is another difficulty to be faced. Before coming to Australia I well recollect placing with a native shepherd four Merino rams, with instructions to use them freely. At lambing-time we had the grand total of two cross-bred lambs. The Merino rams, said the shepherd, fled whenever he approached the ewes to help them in their work. On the face of it the reason given appeared plausible enough, were it not for his unconcealed dislike for the tailless foreigners.

GOATS.

These hardy foragers are invaluable to the more or less thriftless Oriental graziers. In the towns, on the other hand—quite as much in the other cities of the Levant as in Tunis—goats almost entirely supersede the milch cows of Europe. Twice a day the tinkle of their bells is heard through the streets, and the milkman milks the goat at the citizen's doorstep and under his eye. One hears no complaints of watered milk or insanitary milking sheds. The taste of goat's milk is characteristic, but in time one gets used to it.

In the back country, particularly in the hilly sites of the drier districts, covered with brushwood and low shrubs, and more or less destitute of herbage, the goat is invaluable to the Arab. Indeed, it will not only subsist, but even thrive, in localities in which all other types of livestock, with the solitary exception, perhaps, of camels, would starve. There are many, however, who pretend that the goat has been to Tunisia a curse in disguise. Just as the camel is now held responsible for the destruction of many of the shrubs of the Egyptian desert, so the present treeless condition of Tunisia is very generally attributed to the ravages of the goat. In so far as young trees and shrubs are concerned, the passage of a flock of goats will do quite as much damage as a bush fire. In their habitual pasture grounds no young tree can ever be expected to rear its head; and many are the naked, barren hills in Tunisia that bear eloquent testimony to the irrepressible activity of the goat. Summer bush fires are not unknown in Tunisia; many of them, it is stated, are started by the native owners of flocks of goats, so that later on their flocks may be able to browse in comfort on the stunted growth of the charred stumps. This is a severe indictment of the goat as a civilising influence; nevertheless, flocks of goats must long continue to represent one of the principal sources of wealth of the nomadic pastoral Arab. Indeed, I notice that goats are

even commended to the attention of the French landowners as a profitable source from which butcher's meat, acceptable to the Arabs, might be supplied. Mutton, which, as a rule, is scarce for the most part of the year, consists of ram lambs at first, and later on of very old ewes, who have lost any value as breeders. It is recommended that male kids be castrated and sold later on as wether goats, at a time of the year when the meat market is generally bare. Now, whilst as an article of diet, little objection can be raised to kid even by the most fastidious natures, matured goat certainly calls for a specially seasoned palate; and yet if in Tunisia it is marketable, and apparently profitable, there should be no difficulty in accommodating one's self to existing circumstances.

The Tunisian goat is quite distinct from the ordinary European goat, being closely allied, apparently, to the better known Maltese goat. The goats to be seen in the neighborhood of the cities are very good milkers, frequently averaging as much as a gallon of milk a day. The leather from goat skin is very largely used locally in the manufacture of native foot wear and other articles in common use. Goat hair enters into the manufacture of various types of native clothes.

CATTLE.

The cattle-raising districts of Tunisia are situated chiefly in the north of the Regency, where a moderately heavy rainfall usually leads to very fair grazing conditions for five or six months of the year. In the summer months, however, once the stubbles have been eaten out and trodden under foot, the unfortunate beasts have to hustle for a living. The Arabs, it has already been stated, do not feel called upon to make special provision of forage for purely grazing animals. Providence and the unaided natural fruitfulness of the earth is supposed to take care of the latter. Hence, the little heaps of chopped straw and chaff, the residues of harvesting operations, are always kept back to support the working bullocks at ploughing time; since the latter can hardly be expected to take part in heavy manual labor and hunt for food at one and the same time. Consequently, beasts fat in the spring rapidly lose flesh with the approach of hot weather, and the young are almost invariably stunted in growth. In years of extreme drought the Arab owner is compelled either to sell his beasts for a mere song, or else see them slowly die of starvation.

The French authorities are inclined to make it a matter of reproach to the Arabs that they do not put their cattle under cover at night. They appear to infer that exposure to rough weather must necessarily prove injurious to the cattle, as is the case in colder countries. It is difficult to subscribe to this view. Tunisian winters are quite as mild as our own, and if the cattle were well fed, exposure to the weather would do no more than harden them.

It should be noted that it is not dairy herds that are referred to here, but breeding herds, the main function of which is the production of working bullocks. As matters stand, in a country where fences are unknown and robbery fairly frequent, the Arabs are in the habit of shutting up their cattle every night in open roofless enclosures, in which they probably suffer more from rough weather than if they were allowed to graze freely in the open. Bulls, cows, and calves are all kept together in one promiscuous herd, with the result that calves are dropping at all times of the year; although it is stated that the hardships which the Tunisian cow has to face are so great that she rarely rears more than one calf in two years. The Arab milkers usually take half the cow's milk, the balance being left to her calf, which, of course, always runs with her, although provided with a special muzzle which prevents its feeding at will.

The chief function of the Tunisian cattle may be said to be to furnish the means of draught for general agricultural purposes. The Arabs rarely put a horse in front of the plough, although at times hybrid teams, one horse and one bullock, are occasionally to be seen unevenly yoked to a native plough. In the dry south, the hardier and equally deliberate camel tends to replace the ox as an agricultural draught animal. It should be stated that the native yokes are cruel, primitive implements, not calculated to turn to best advantage the maximum effort of the team.

For the most part, Tunisian cattle appear to belong to a breed common to the whole of the North African coastal country, and also to Spain. They are said to be analogous to the Texas cattle, and those of some of the South American States. Here and there crossbred animals are to be met with, connected generally with Italian and Sicilian breeds, and occasionally with French ones. Although on various occasions improved French breeds have been introduced into the Regency, they do not appear to have come into favor, even with the French landowners; mainly probably because of their inability to face with equanimity six months of slow starvation.

These Tunisian bullocks are small and sturdy, measuring from 43in. to 48in. at the withers; they are said to be docile and easily trained to work, whilst the work done by them is generally all that could be expected from their light weight and the meagre feeding rations allowed them. For the Arab, the unit of superficial area is represented by the "mechia"; that is to say, the area which the owner of a single team of bullocks hopes to break up and sow to wheat in the course of a single season, which generally extends to 25 acres. In ordinary circumstances, however, the Arab is perfectly satisfied with his efforts if he can succeed in sowing between one-half and two-thirds of his "mechia," which may be taken to measure the working capacity of small bullocks, kept alive on a few handfuls of chopped straw.

As butchers' beasts these cattle are said to fatten readily when good grass is available; as milkers, however, it is to be feared that Tunisian cows must

be reckoned very poor. Their lactation period rarely extends over three months, during the course of which they probably do not average more than a gallon a day ; although it is true that some are occasionally met with yielding as much as $1\frac{3}{4}$ galls., or even 2galls. a day.

Tunisia is within easy reach of Europe, and one would imagine that she would find some profit in exporting butter to the large consuming centres of the Continent. For success in this direction, however, the importation of improved breeds of cattle would be necessary ; and this is not possible until Tunisian farmers shall have learnt to mend their ways.

CAMELS.

The "ship of the desert" is used throughout the Regency as a pack animal ; and very weighty loads it is made to convey over the rough tracks that serve the purpose of roads. Again, with horses and mules, the camel shares the honor of going blindfolded from sunrise to sunset round the short circular tracks setting in motion the creaking wooden water-wheels of the native wells. In the extreme south of the Regency the camel takes the place of the ox as general agricultural draught animal.

This ungainly animal is relatively slow growing, not attaining to maturity until a full 8 years old ; and with luck may attain to the green old age of 15 to 20 summers. The Arabs do not scorn his flesh, should fortuitous circumstances lead to his death. He is too valuable to them, however, to be made an habitual article of diet.

The secret of the camel's usefulness in desert regions is its ability to withstand thirst, and if necessary to subsist upon the hard, thorny shrubs peculiar to these regions. The Arabs make use of the camel both as a pack animal and a saddle animal ; the former is a clumsily built, heavy animal, capable of carrying with ease over long distances loads of 500lbs., and more ; whilst the latter is more gracefully and lightly built, of great endurance, and capable of developing great speed. Riding camels are said to cover, without difficulty, in the course of a day's work, distances of 120 to 130 miles. The differences in build of these two types of camels are practically those that distinguish the draught from the saddle horse. Tunisian camels are reputed to be quiet and docile, albeit given to biting, a means of offence which their long sinewy necks enable them to resort to with great ease ; hence, to keep them out of mischief it is customary to provide them with "Halfa" muzzles. Bull camels, however, are apt to be both treacherous and dangerous in the rutting season, during the course of which it is customary to keep them in confinement. Camels appear to be very prone to mange, which in serious cases gives them a very forlorn, moth-eaten aspect. The Arabs are very successful in warding off this disease by periodically anointing the animals with Stockholm tar. Tar is said to possess the additional advantage of protecting camels from flies and other troublesome insects.

ASSES AND MULES.

The ass is the inseparable companion of the poorer classes of natives ; to them he is both pack and saddle animal, but is practically never availed of for traction purposes, as is the practice in various parts of Europe. The ass is to be met everywhere in the Regency, both in the cities and in the country, except at times in rough hilly country, the occasional lurking-place of hyenas. These beasts appear to have a particular liking for the flesh of the ass, and the existence of the latter is always more or less precarious wherever the former are to be found. Asses, notwithstanding their insignificant appearance, are probably able to carry heavier loads, proportionately to their weight and size, than any other domesticated beast of burden. It is no uncommon sight on the dusty Tunisian roads, to see a 14 or 15 stone Arab seated majestically on a diminutive ass, whilst his wife trudges along in the rear, goading the beast on, or else carrying some of the domestic effects of her lord and master. The average Tunisian ass is a rather small animal, inferior both in size and appearance to the Egyptian or Spanish asses. In the season, however, very superior types of Jacks are to be met with, travelling from market town to market town. The latter, however, are mainly used for the breeding of mules.

The Tunisian mule is considerably lighter and built on finer lines than the heavy draught mules of southern Europe. It is very freely used by the Arabs for both carriage and saddle purposes. It is the mule, too, that generally hauls the light carts of the country. The wealthy Arab is very fond of personal display, which he does not disdain to extend to the animals that have the honor to carry him or haul him along. In this connection it is often brought home to one in Tunisia that a well-bred, well-groomed, sleek mule, set off in its gorgeous trappings, is a very showy beast.

French landowners generally make use of the heavy draught mules of southern Europe for general agricultural purposes in preference to draught horses, which are not readily obtainable in the Regency. They present the additional advantage of being hardier than horses, and less difficult in their food requirements. These beasts are generally drawn from France and Spain, and sometimes from Algeria. It would appear somewhat anomalous that they should not be bred locally to a greater extent than is the case.

HORSES.

The horse of the country is the Barb, or African horse, which is to be found throughout the coastal country of northern Africa. The Barb lacks, perhaps, the perfect symmetry of the pure-bred Arab ; he has not the chest measurement nor the breadth of loins of the latter. Taken all round, however,

the well-bred Barb is a typical light cavalry horse or saddle hack. The Tunisian Barb varies much in size, attaining at times 15·3 hands at the withers, whilst at others, particularly when mountain-bred, he is no more than a stout, active, sure-footed pony. Unfortunately, the general carelessness of the native temperament reacts quite as much on the horses of Tunisia as upon other forms of livestock. Sound and unsound horses are more or less indiscriminately mated together, whilst their general growth is allowed to become stunted from lack of proper nourishment. In most cases young horses are broken in to saddle work at too early an age, or at all events, carelessly set tasks beyond their powers of endurance. Hence, strained tendons and general limb blemishes are rather the rule than the exception. The absence



Tunisian Barb Mare.

of fences to keep back horses within their pasture grounds leads the natives to hobble them when they are put out to grass. These rough hobbles are rarely examined or removed, and permanent injury to the limbs are usually the result. The Arab shows great appreciation for an easy ambling gait; hence, one of their first occupations is to teach the horse to amble at command, by methods that are more effective than humane. Unfortunately, undue reliance on this mode of motion invariably leads to a sort of shuffling movement of the limbs and a common tendency to stumble in most horses broken in by the Arabs.

On the whole, it would appear that well-bred Barbs are difficult to secure in a country in which one would expect them to be numerous. There are two

light cavalry regiments stationed at Tunisia, and it is stated that they are unable to secure in the country sufficient remounts for their ordinary requirements. The Tunisian Government has taken various steps towards improving the condition of horse-breeding in the country ; a stud book has been opened, suitable stallions have been imported from Algeria, &c.

The pure-bred Arab horse of Asia is occasionally to be met with in Tunisia, particularly in the southern districts, on the borders of the desert. Crosses between the Arab and the Barb are more frequent.

Apart from a few French mares casually imported by French landowners, and occasionally discarded heavy artillery horses, there are no draught horses worthy the name in Tunisia. Heavy agricultural work is usually left to bullocks and mules, whilst light draught work is occasionally done by the heavier types of Barb horses.

Pigs.

To the Mohammedan pigs are quite as much unclean animals as they are to the Jew ; hence what pigs are to be found in Tunisia may be taken to belong exclusively to European owners—to the French in the country districts, and to the Maltese and Sicilians in the neighborhood of the cities. The local pig is, from our point of view, a very inferior type of animal, partaking a good deal of the greyhound in his build ; indeed, his actively-built framework is all in his favor, for, like all forms of Tunisian livestock, he has to depend for his livelihood a good deal on his own ingenuity. It would appear that the methods of the Tunisian pigbreeders are very much the methods of our Saxon forefathers in pre-Norman days. The herds are allowed to roam about the cork oak forests in charge of a herdsman. Here they live on fallen acorns when the latter are available, or on what roots or bulbs they are able to root up. At times the surplus acorns are collected by Arab women and children, dried, and stored away for future use.

The wild boar is indigenous to Tunisia, and generally common in the districts in which these semi-domesticated Tunisian pigs are kept ; and it is said that not infrequently the sows farrow striped litters, which tell their own tale.

The Tunisian pig does not fatten readily ; indeed, he frequently dies when cribbed up in a sty. Therefore, the flesh as a rule carries a very high proportion of lean meat, but is not otherwise unpleasant. A few attempts have been made to acclimatise some of the better types of French breeds.

VINE-GROWING.

The native Arab population have from time immemorial been growers of table grapes, but it is only since the French occupation of the country in 1881

that wine-making grapes have been planted. The progress of the industry since that date is shown in the table below :—

Tunisian Vine-growing Statistics, 1882-1909.

Year.	Area.	Production.	Yield per Acre.	Price of Gallon in Bond.
	Acres.	Gallons.	Gallons.	Pence.
1882.....	4,415	?	?	?
1885.....	6,200	?	?	?
1890.....	15,415	?	?	?
1895.....	19,325	4,180,000	276	7 $\frac{3}{4}$
1900.....	28,500	4,950,000	203	7 $\frac{3}{4}$
1905.....	40,502	6,600,000	182	4 $\frac{1}{2}$
1906.....	41,688	9,020,000	244	4 $\frac{1}{2}$
1907.....	41,062	7,861,040	213	4 $\frac{1}{2}$
1908.....	41,127	7,590,000	205	4 $\frac{1}{2}$
1909.....	40,327	7,700,000	213	4 $\frac{1}{2}$

In the above table, under “ Area ” are included both European and Arab vineyards. The latter are assumed to show no variation from year to year, and to be represented by the figure 4,165 acres. The columns dealing with “ Production ” and “ Yields,” on the other hand, have exclusive reference to the vineyards owned by Europeans. For these vineyards the average yield per acre is represented by 212galls. of wine, or what corresponds to about 1 $\frac{1}{2}$ tons of grapes. And since the varieties grown are of the heavy-bearing type, such as Mataro, Morrastel, &c., these yields must be looked upon as light. It should be recollected, however, that when vineyard areas are gradually extending in any country the total area under vines will always include a fair proportion of vines not in full bearing, or even not in bearing at all. Yields, too, must necessarily vary with districts and with the individual skill and care of owners. It is stated that many of the well-kept older vineyards placed in the better districts yield between 520galls. and 700galls. of wine to the acre, corresponding to 3 $\frac{1}{2}$ tons to 4 $\frac{1}{2}$ tons of fruit.

There is no doubt that since 1905 Tunisian vinegrowers have found themselves in a very difficult position. Seasons generally have not been favorable to heavy yields, and the price of wine in bond before shipment has fallen from 7 $\frac{3}{4}$ d. to 4 $\frac{1}{2}$ d., and has remained constant at that price ever since. The average quantity of wine exported per annum during the past five years has been represented by about 2,000,000galls., having an average value in bond before shipment of £41,815 ; of this quantity the French ports absorb

over 94 per cent. Thus it will be seen that a large margin is left for local consumption, and no doubt much of the wine produced realises more than 4½d. a gallon. Nevertheless, whenever there exists in a country a floating exportable margin of any article over and above local requirements, the pressure of low export prices must make itself felt on the home markets, with the inevitable result that many individuals are involved in great hardships. The result in Tunisia has been that uprooting has been started on a small scale, and, unless export prices show an upward tendency in the near future, it is probable that uprooting will be followed on a more extensive scale.

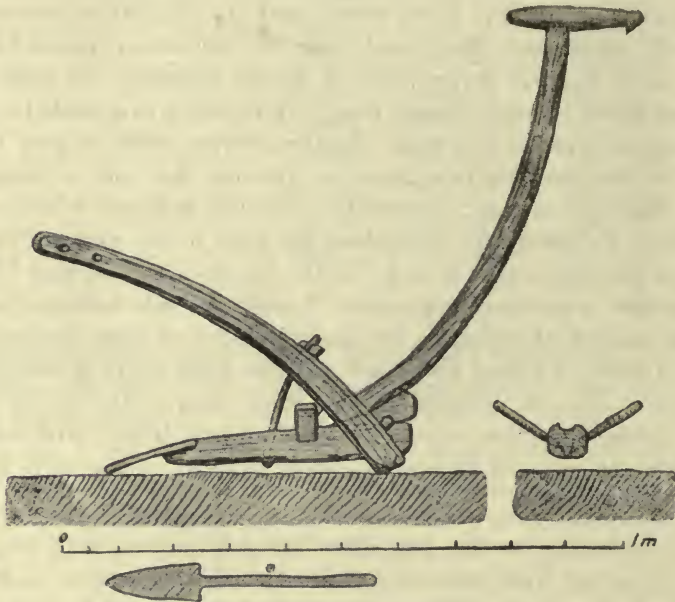
In this connection it is worth noting that the Tunisian vinegrowers are practically defenceless when faced with unremunerative prices for their wines. As is the case in the south of Europe generally, the cellars must be cleared before the new vintage, since no provision is ever made for storing more than one vintage at a time. Further, buyers would be more inclined to dock a wine that was more than one year old than offer a higher price for it. Hence the owner is practically compelled to accept whatever price is offering. Unfortunately, November—the time of my visit to Tunisia—represents the dead season in so far as the vine is concerned, and I did not have occasion to see many vineyards. I could not help noticing, however, a certain amount of neglect in the general upkeep of some vineyards, the owners of which in former years took a special pride in the thoroughness of their work. After all, 212galls. of wine to the acre at 4½d. at the port of export represents a gross return of only £4 an acre, which, after deduction of working expenses and interest on capital engaged, cannot leave much in the way of net profits.

In normal times, however, very little fault can be found with the general manner in which Tunisian vineyards are handled. Opinions in favor of subsoiling before planting appear to be very firmly rooted. It is stated that whenever the practice has been adopted the vineyard has come earlier into bearing, and in years of drought has suffered far less than vineyards that had not been subsoiled. Couch grass is the special bugbear of the Tunisian vinegrower, and it is strongly urged that this weed should always be thoroughly cleared out of the ground before planting operations have been started. If this weed be allowed to get a firm hold of a vineyard it has the effect of reducing yields very considerably; and to eradicate it completely from established vineyards some growers have been put to expenditure varying from £16 to £20 to the acre.

All Tunisian vines are grown on the bush, and trellising is practically unknown. Spur-pruned varieties are almost exclusively grown, with the exception of a few occasional patches of Shiraz or Carbenet. Artificial manures appear to have been no more effective for vines in Tunisia than

they have been with us ; and a good dressing of farmyard manure once in three years is very generally recommended.

Until very recently Tunisia stood amongst the few vine-growing countries as yet free from the phylloxera ; but the neighboring vineyards of Algeria have been affected by the pest for many years past. A few years ago, however, a phylloxera patch was detected in a vineyard in the neighborhood of Souk-el-Khemis. Prompt steps were taken towards uprooting the affected vines, and treating the soil with carbon bisulphide, and no further spread of the disease has been detected, although all the vineyard area of the Regency is subject to regular systematic inspection. Downy mildew (*Plasmopara*



Tunisian Plough (after Ringelman).

viticola), a disease from which we are fortunately free, is also common in Tunisian vineyards, particularly in years that are abnormally wet in the spring time. The presence of this disease has the effect of raising the cost of production, in view of the special preventive treatments which it throws upon growers. No recourse has yet been had to American vines, nor is there likely to be for many years to come, in view of the scattered condition of Tunisian vineyards, and the improbability of the phylloxera spreading very rapidly, even if it did ever get out of hand.

Individual Tunisian vineyards are, as a rule, very large, and in the hands of companies or wealthy proprietors. The average area would probably vary between 250 and 1,000 acres. The practice of selling grapes to wine-makers is practically unknown in the Regency ; hence, every vineyard owner

has his own cellar accommodation. In the earlier days of the French occupation some very expensively-built cellars were erected; the main object in view in these cases appeared to be to secure cool fermenting chambers, which were frequently built at great expense underground. The opinion, however, has come to prevail, as it has with us, that coolness of cellar premises was no guarantee of low temperature in the fermenting vats, and that plenty of ventilation was one of the chief requisites of a good fermenting cellar. Refrigerating plants are now looked to as giving perfect control over the temperature of vats in fermentation. The cost of these machines is certainly heavy, but not beyond the reach of the large cellars in which Tunisian wines are usually made.

How do Tunisian wines compare with our own, and are they likely to enter into competition with us on the English markets? Tunisian red wines are stronger, heavier, fuller, more deeply colored than the average wine of the south of Europe. In all these points, however, they are generally inferior to our average type of export wine. It seems to me that they will continue to be so as long as Tunisian growers adhere to the heavy-bearing varieties that are almost exclusively grown there at present. I think, however, that if Shiraz were grown more extensively in Tunisia the type of wine made there would approach our own. I have already stated that the great bulk of the Tunisian wine trade is with France. In this country Tunisian wines, in conjunction with Algerian wines, are used mainly for blending purposes, in preference to Italian and Spanish wines, against which the French general tariff discriminates rather heavily. Tunisian wines do not appear to have found their way into England; if, however, these wines were heavier and fuller the low price at which they can be secured in bond might prove an irresistible temptation to London wine merchants. The moral of this is, I think, that South Australian exporters should beware of the danger of unduly inflating the price of export wines.

OLIVE-GROWING.

Olive-growing has at all times occupied an important position in Tunisian agriculture. Indeed, from the statements of ancient writers and the testimony of ruins and remains of ancient olive groves, it would appear that the olive was far more extensively cultivated in the Roman era than is the case at the present time. When, in the seventh century, the Arabs overran Northern Africa they are said to have found it a well-wooded country, covered with luxuriant olive groves, extending almost to the edges of the great desert. Contemporaneous Arab writers, in their usual hyperbolic style, have stated that at the time of the invasion a traveller might proceed from Tripoli to Tangiers without stepping out of the shade of sheltering trees. Unfortunately, these nomadic children of the vast empty spaces of Arabia did not realise the value of their new possessions, and right speedily axes and fires were set the task of clearing the horizon, that the old familiar home conditions

might be reproduced. It is in this manner that the great bulk of the olive plantations came to an end; nor has Tunisian olive-growing ever re-acquired its preponderating position in the agriculture of the country. Nevertheless, even at the present day, the importance of the industry is still very considerable, and a wise Government is doing all in its power to enable the olive gradually to recover lost ground. It should be stated that in all Mediterranean countries olive oil is, quite as much as bread, a staple article of diet with all classes of the population, but particularly with the middle and the poorer classes. It not only replaces butter, but is far more freely used than the latter; and particularly is this the case with the Arabs. But the olive groves of Tunisia can do more than supply the immediate wants of its own population. Under improved treatment, fostered by the intelligent support of government measures, the available export surplus is rapidly increasing. At the present moment olive oil represents one of the most important items amongst agricultural produce exported by the country; and in the near future there is every likelihood that it will eclipse all other exports. The figures below indicate the average value of the principal items of agricultural export during the past five years—

Average Yearly Value of Principal Items of Agricultural Produce Exported from Tunisia, 1905-1909.

	£
Barley	340,399
Olive oil	319,414
Wheat	123,403
Wine	42,624

The number of olive trees in the Regency in 1909 is given as 11,425,522. The distance apart at which they are planted varies with the districts; in the north, for instance, a distance of 25ft. in all directions is usually adopted; in the centre 40ft. is the usual distance, whilst farther south as much as 80ft. is generally adopted. If we assume 40ft. to be the average distance, this would give us about 27 trees to the acre, and a total area under olive trees for the Regency of about 423,168 acres. Many trees are as yet young, and not, therefore, in full bearing. The olive oil production in the Regency during the past five years is indicated below—

Year.	Total Olive Oil Production. Gallons.	Value in Bond per Gallon.	
		s.	d.
1905	5,385,000.....	2	0 $\frac{3}{4}$
1906	5,346,000.....	2	0 $\frac{3}{4}$
1907	8,624,000.....	2	0
1908	1,496,000.....	3	4
1909	11,100,000.....	3	4

These various data will serve to give some idea of the present importance of olive-growing in Tunisia. The point, however, that should, I think, present the greatest interest to us is the ability of the olive trees to thrive even in the driest districts of this dry country. Most of us are aware that the olive tree is a highly characteristic feature in the landscapes of most south European countries ; but we know, too, that these countries are neither as hot nor as dry as South Australia. Tunisia, on the other hand, presents climatic conditions analogous to our own ; indeed, on the whole, its climate is perhaps more trying to vegetation than ours. It is worth noting, therefore, that the olive tree is profitably grown practically through the length and breadth of this country. It is to be found in the northern districts, with their 20in. rainfall ; in the central districts with a rainfall averaging between 11in. and



Tunisian Well-water Lifter.

12in. ; and in the southern districts, where the average rainfall varies between 8in. to 10in., and where the general climate is extremely hot. Indeed, it is said in Tunisia that the olive can be grown to advantage in districts in which cereals fail three years out of four. In the circumstances, therefore, might it not be to our advantage to pay more attention to the olive in our drier localities ?

Curiously enough, in Tunisia the most profitable olive groves are situated in the dry southern districts ; mainly, it is true, because they appear to receive greater care and attention at the hands of their owners. In northern districts, whatever the character of the seasons, the cereals always leave a respectable margin of profit to the native grower ; and although he has no conscientious scruples against the acquisition of fortuitous wealth, he generally

objects to superfluous efforts which lead to the amassing of capital. The cereals are sufficient unto his daily bread ; hence, his olive trees are neglected as unnecessary luxuries. In the dry south, on the other hand, the olive tree is the main source of the agricultural wealth of the country, and is respected accordingly.

In the north, crops of wheat and barley are frequently grown between the rows of olive trees. Indeed, at times the only form of tillage ever given to the olive grove is represented by what is essential to the growing of these cereal crops. The trees are butchered rather than pruned, and always present an unkempt, neglected appearance. Many of the trees are of great age, the main trunk being no more than a thin layer of bark clinging to masses of dead wood. Manures are never availed of, and at harvest time the fruit, instead of being carefully picked off, is systematically threshed off with heavy wands, much to the ultimate disadvantage of the trees. This slovenly, neglectful treatment of the northern growers appears to have been a subject of anxiety to the Moorish Government as far back as the eighteenth century ; and from the point of view of Government, not without sufficient cause. These olive groves were subject to direct taxation in proportion to the yields secured, and small insignificant yields meant a serious shortage of revenue to the Government. The remedies adopted by the Moorish Government would be considered drastic, even at the present time. The olive groves, although private property, were put under the supervision of a sort of native forest department, whose apparent duty it was to compel owners to bestow proper care upon their trees. Needless to say that very little good ever came of the supervision of these Eastern officials. The French Government, however, who within recent times have inherited amongst other things these special duties, have done all in their power to bring about a more rational treatment of these valuable trees. And they have been so far successful that new ground has been broken, and, after centuries of stagnation and retrogression, the area under olives shows once again a tendency to expand. In the dry southern districts the groves are well cared for and efficiently tilled, whilst it is only occasionally that intercalary crops are to be found growing between them. Native growers are well aware of the scantiness of their normal rain supplies, and every effort is made towards turning to practical advantage every drop of rain that falls. As I have already shown to be the case in Greece, the olive groves are divided up into a series of basins, separated one from the other by elevated mounds or ridges, and connected by means of surface drains with the roadways and available catchment areas of the neighborhood. Hence, every drop of rain that falls is naturally directed towards the olive groves. The trees of the natives are very well pruned, and it is stated that in careful hands olive trees begin to become profitable towards their sixth and seventh years. Two facts appear to have attracted French landowners to this district : (1) The important profits to be derived from olive trees ; and

(2) the fact that Government land was being offered at very low prices, conditionally on its being planted to olive trees. Unfortunately, as generally happens in such cases, the French landowners, in their natural impatience to possess as early as possible vast areas under profit-bearing trees, attempted to put in larger areas than their means permitted them to attend to properly, with the result that the profit-bearing age of the neglected trees has frequently been put back to their twelfth and even their fifteenth year. Indeed, in these dry districts everything points to the fact that olive trees are profitable only so long as they receive the unremitting care and attention of their owners.

Whilst in Tunisia I had occasion to pay a hurried visit to Sousse, one of the principal centres of the olive-growing districts of the south. Unfortunately, 1910 proved to be an extremely disastrous year to olive-growers throughout the Mediterranean coast; and the neighborhood of Sousse was no exception to the rule. As I had already occasion to notice in Spain, there was hardly an olive to be seen on these Sahel olive trees; and the natives, who never think of making provision for lean years, are likely to be reduced to great distress. I visited some of the olive oil factories and was surprised to notice that quite green olives were being crushed. I was told that this practice was being adopted because the crop was so small, and the destitution of the natives so great that it was impossible to protect the trees from thefts.

The most interesting factory that I was able to visit in this district was that of Les Usines du Sahel. This firm does nothing but purchase the waste pressed pulp of the olive oil manufacturers of the neighborhood, from which it extracts, by means of carbon bisulphide, the residual oil that cannot be extracted by ordinary pressure and hot water. The process adopted for the purpose may briefly be described as follows:—

The olive pulp, or marc, is first freed from superfluous moisture by exposing it in open troughs heated by steam coils; when sufficiently dry the pulp is conveyed into huge metal cylindrical tanks, into which carbon bisulphide is pumped. The liquid gradually dissolves the oil, and is subsequently drained off into a retort, in which the carbon bisulphide is distilled off from the oil. It is condensed and may be used again for another mass of pulp. A steam jet is made to play through the tank, so as to remove the last traces of carbon bisulphide and oil. Finally, the pulp is removed from the tanks, dried and used for fuel purposes by the firm, who find it superior to coal. This process extracts from the residual pulp of the olive oil manufacturers from 6 per cent. to 9 per cent. of a crude oil, which is used for the manufacture of soap, or for lubrication purposes. This oil always retains an odor and taste characteristic of the treatment it has undergone, and can never be used for ordinary culinary purposes.

I left Tunis on the 27th November, and, after spending a few days in the south of France, I paid a hurried visit to Italy. My time there, however, was very limited, and I was unable to collect agricultural data of any value.

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